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ABSTRACT

The articles in the collection discuss the theory and practice of seven Educational Sciences. These are the basic elements of a conceptual framework for the education profession proposed by Joseph E. Hill in the belief that if educators are to establish mutual understandings of educational problems and phenomena, a unifying conceptual framework and language are imperative. According to A. E. Jimenez, compiler of the collection, Hill urges educators to become skilled in using information pertaining to (1) symbols and meanings, (2) perceptions, (3) inferential patterns, (4) the biochemistry of memory, (5) individual cognitive styles, (6) counseling, (7) administrative and teaching styles of college personnel, and (8) systematic analysis and decision making. In addition to Jimenez' introductory article and three articles authored or co-authored by Dr. Hill (one in English, one in French, and one in both a French and an English version), the collection includes 11 articles by other authors: (1) six articles in English only treating cognitive style mapping and individualized or personalized education; (2) two articles in French only on these subjects; and (3) three articles in both French and English versions, one describing Project ARISTOTLE. There is an emphasis on occupational education throughout the collection. (AJ)

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MARCH 1976

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The Educational Sciences: Their Relevance to Adult Training in Canada

Les sciences pédagogiques: leur contribution à la formation des adultes au Canada

U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

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Innovations in Training Series

In this series, Adult Training is offering to a limited readership, collections of papers which because of their specialized nature would not ordinarily be printed in our more widely circulated quarterly.

Our prime intention is to make these papers available with few editorial modifications and in as simple a format as possible. They are not necessarily intended to present a definitive perspective of the subject in question. On the contrary, we hope to deal with subjects that are still at a pioneering stage in their development. Consequently, diverging views, and even contradictions are likely and, in fact, welcome.

Furthermore, the developing terminology makes it difficult and not always very useful to attempt translation of all articles.

We hope you will find this first issue in our series to be useful and stimulating and welcome your comments, criticisms and suggestions.

Série Innovations en formation

Dans cette série, Formation des adultes présente à un auditoire limité, des recueils de textes qui normalement ne seraient pas publiés dans sa revue trimestrielle en raison de leur caractère spécialisé.

Notre intention première est de diffuser ces textes avec le minimum d'adaptations et dans le plus simple format. Ces textes n'offrent pas nécessairement une perspective complète du sujet. Au contraire, nous espérons aborder des domaines qui ne sont qu'à l'état embryonnaire. De ce fait, les divergences d'opinions, voire même les contradictions sont souhaitables.

En outre, la terminologie naissante rend difficile et parfois téméraire les tentatives de traduction.

Nous espérons que ce premier numéro saura vous intéresser. Nous recevrons avec plaisir vos commentaires et suggestions.

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* Ces articles ont paru précédemment en français dans le document de travail: PROFIL D'APPRENTISSAGE ET ENSEIGNEMENT PERSONNALISE, novembre 1974, Ministère de l'Education du Québec, DTE-01-0474.

The materials in this periodical have been selected for their potential value in providing information on adult training and related areas. Opinions expressed in the materials, however, are the views of the authors concerned and not necessarily those of organizations with which they may be associated.

Les articles de ce périodique ont été choisis en raison de leur intérêt en matière de formation des adultes. Toutefois, les opinions exprimées n'engagent que la responsabilité de leurs auteurs et ne réflètent pas nécessairement les vues des organismes auxquels ils sont associés.

INTRODUCTION

In its effort to keep Canadian adult educators and trainers abreast of innovations in the field, Adult Training has prepared this collection of articles on the Education Sciences.

The concept of the Educational Sciences was originated by Dr. Joseph Hill, President of Oakland Community College, Bloomfield Hills, Michigan, and has been applied extensively in a number of leading institutions in Canada over the last few years.

Its purpose is to provide a conceptual framework within which basic issues of instruction can be analysed and resolved. The Educational Sciences provide a common language by which educators can communicate systematically on instructional goals, methods, evaluation, etc.

Education and training, it is argued, must be regarded as a field of applied knowledge, similar to

Afin de tenir les enseignants et moniteurs canadiens de l'éducation des adultes au courant des innovations dans leur domaine, Formation des adultes a préparé ce recueil d'articles sur les "Sciences pédagogiques".

On doit les "Sciences pédagogiques" au professeur Joseph Hill, président du Oakland Community College, Bloomfield Hills, Michigan. Au cours des dernières années ses concepts ont été largement appliqués dans plusieurs des principales institutions canadiennes.

Les Sciences pédagogiques ont pour but de fournir le cadre conceptuel d'analyse et de résolution des questions pédagogiques essentielles. Elles mettent à la disposition des enseignants un langage commun qui leur permet de discuter de façon systématique des objectifs, des méthodes et de l'évaluation de l'enseignement.

L'éducation et la formation doivent, dit-on, être considérées comme un domaine de connaissances

medicine, engineering and law, in which frames of reference and languages have evolved to assist communication and inquiry.

The conceptual framework that Dr. Hill and his colleagues have developed comprises seven educational sciences:

1) Symbols and their meanings;
2) Cultural determinants of the meanings of symbols;
3) Modalities of inference;
4) Biochemical and electrophysiological aspects of memory-concern;
5) Cognitive styles of individuals;
6) Teaching styles, administrative styles and counselling styles;
7) Systemic analysis and decision-making.

Of these, "cognitive style" is the most encompassing as it combines the information derived from the first four sciences. It is in this area that most work has taken place. Using this approach, a "map" is

appliquées, semblable à la médecine, au génie et au droit, où les schèmes de référence et le langage ont évolué pour faciliter la communication et la recherche.

Le cadre conceptuel développé par le professeur Hill et ses collègues englobe sept sciences pédagogiques:

1) Les symboles et leurs significations;
2) Les déterminants culturels;
3) Les modes d'inférence;
4) Le complexe mémoire-intérêt;
5) Les styles d'apprentissage;
6) Les styles d'enseignement, d'administration et de conseil;
7) L'analyse systémique et la prise de décision.

La plus générale, le style d'apprentissage, fait la synthèse de l'information obtenue au moyen des quatre premières sciences. C'est ici que s'est effectué le plus de travail. Cette méthode

designed to determine the most effective manner in which an individual can reach his learning objectives. In theory, therefore, the usual haphazard or intuitive process of selecting learning methods can be replaced by a more rigorous and scientific method.

sert à produire un tracé appelé graphe d'apprentissage permettant de déterminer pour un élève le moyen le plus efficace d'atteindre ses objectifs d'apprentissage. En théorie, on peut donc remplacer les méthodes arbitraires ou intuitives de l'enseignant par cette approche plus rigoureuse et plus scientifique.

The collection of articles assembled for Adult Training considers both the theory and practice of the Educational Sciences. It makes no pretence of providing a uniform depth of coverage on all issues. Indeed, the Educational Sciences, like any recent innovation remains controversial. It does not offer a solution to every problem, and it is open to criticism, but it does represent an imaginative attempt to take a fresh look at a field all too often regarded only in traditional terms.

Le recueil d'articles de Formation des adultes étudie tant la théorie que la pratique des Sciences pédagogiques. Il ne prétend pas accorder nécessairement la même attention à toutes les questions. En effet, comme la plupart des véritables innovations, les sciences pédagogiques prêtent à controverse. Elle n'offrent pas toutes les solutions et certaines des leurs sont susceptibles de critique, mais leur approche créatrice permet d'envisager sous un angle nouveau un domaine trop souvent perçu selon une optique traditionnelle.

Apart from the articles by Drs. Hill and Nunney of Oakland Community College and Dr. Baecher,

Tous les articles sauf ceux des professeurs Hill et Nunney de l'Oakland Community College et du

Fordham University, the collection offers Canadian experience in applying the Educational Sciences.

Articles appear in their original language except for a few key ones which we have provided in both English and French. A new area of investigation developed largely in one language provides a considerable challenge for investigators who work primarily in another language. The translations provided in this collection of articles should help overcome some of these problems.

The Editors of Adult Training/Formation des adultes would like to thank Mr. Andres Jimenez of Humber College, Toronto for compiling this collection of articles. Mr. Jimenez is one of the Canadian pioneers of the Educational Sciences, and his work on this publication is greatly appreciated.

professeur Baecher de l'Université Fordham font état d'expériences d'application des Sciences pédagogiques au Canada.

Ces articles paraissent dans leur langue d'origine, sauf quelques articles essentiels que nous présentons en français et en anglais. Un nouveau domaine où la recherche se fait surtout dans une langue pose un défi à ceux qui travaillent essentiellement dans une autre langue. Nous espérons que les traductions comprises dans ce recueil aideront à surmonter certains de ces problèmes.

Les éditeurs de Formation des adultes/Adult Training tiennent à exprimer leur appréciation et leur reconnaissance à M. Andres Jimenez du Collège Humber de Toronto. M. Jimenez, l'un des pionniers dans le domaine des Sciences pédagogiques au Canada, a rassemblé les textes de cette publication.

Readers are invited to send their comments and suggestions on specific articles to the authors in question or to Mr. Jimenez. General enquiries may be directed to the Editor at the following address:

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IN SEARCH OF A CONCEPTUAL FRAMEWORK FOR A PROFESSION

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The Challenges of Educational Development

Working on staff and educational development in a community college is an exciting and rewarding experience. However, it can also be an ulcer-producing and frustrating chore.

The community college seems to be the melting pot of people from all walks of life: engineers, accountants, industrialists, businessmen, nurses and teachers, to mention only a few.

Whereas in other organizations this diversity can be a source of conflict, in the college system it has become the enriching and invigorating yeast which induces the fermentation of varying innovations.

Designing a program which will contribute to the growth and professional development of college personnel can be a challenging job. Although staff members have their own unique personalities and backgrounds, their own abilities and styles, they all have one common asset: they are professionals. They are experts in their specialized fields. Despite this, some of them feel inadequate and insecure when they teach or act as academic advisors, or program administrators. They know what to say or what to do; the difficulty lies in how to say it or how to go about it.

Owing to a lack of training and experience in teaching, academic advising or program management, many staff members undergo the ordeal of learning by mistakes— to the detriment of the college and the staff themselves.

A great effort has been made to improve the in-service training program for staff members in the college system. However in many instances, the outcomes have not been satisfactory. More disagreements than consensus have been created; more heat than light.

Professional development activities were often centered on the favorite topics of administrators. Staff members were pressured to participate without due regard to their sensitivities or intellectual make-ups. The results were a waste of time and effort.

One of the factors contributing to the waste of human resources in the college system is the confusion among college personnel as to

the mission of the college. This confusion focuses on the controversial questions of whether the college objective is to educate or to train students, and whether teaching is a science, an art or a profession.

This paper does not intend to deal with these controversial subjects, but rather to survey several developments in this area of concern, for information and discussion purposes.

Need for a Conceptual Framework

In his article "Educational Innovation — the Profession of Education and the Art of Science of Teaching," Gabriel D. Ofiesh commented:

> "Teaching is not today a profession. It is, at best a quasi-profession. It will not become a true profession until it develops an educational and instructional technology based on the science and theory of instruction rather than a set of theories and vague methods and practices which more often are a poor and, only in very rare moments, an excellent art."[1]

These comments were made in 1966. At that time a movement to alleviate the confusion in education by utilizing approaches similar to those used in various professions had already been started by researchers and innovators.

Members of the medical profession have means of communicating with each other as do lawyers, engineers and nurses. They have commonly agreed upon goals, practices and definitions, a common language and conceptual framework.

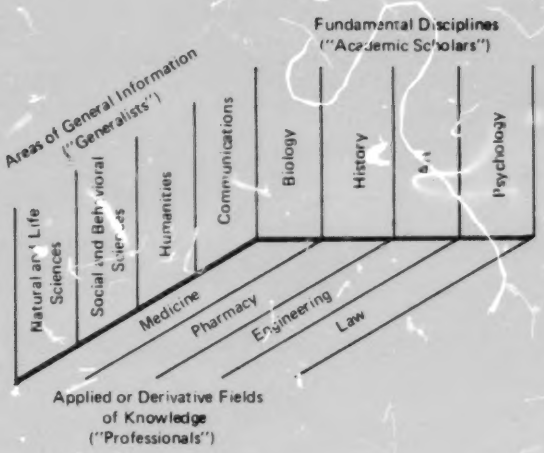
If educators are to establish mutual understandings of educational problems and phenomena, a unifying conceptual framework and language are imperative.

A Dimension for Education

In his work on the Educational Sciences, Dr. Joseph E. Hill[2] illustrated his ideas by using a three-dimensional model.

Fundamental Disciplines are sure and distinctive forms of information produced by communities of scholars. This group of persons (the Academic Scholars) study such disciplines as biology, history, art,

psychology or mathematics.



Complementing the fundamental disciplines are the Applied or Derivative Fields of Knowledge generated by practitioners (Professionals) who deal with practical considerations of the human condition. Medicine, pharmacy, law and engineering are example of applied fields of knowledge. The applied fields, composed of both sciences and arts; are designed to explain phenomena and solve problems on the practical aspects of the human situation. For example, the applied field of knowledge called "medicine" is composed of the medical sciences and the medical arts; engineering, of the engineering sciences and the engineering arts.

Although much of the knowledge produced by academicians and professionals is frequently beyond the comprehension of persons outside the particular specialization, and may appear at times irrelevant to them, there is a great need at least to know about the structures and functions of such information.

Clusters of information (grouped in Areas of General Information) related to such broad areas as natural and life sciences, social and behavioral sciences, humanities and communications can be formed on the basis of representative ideas, methods of inquiry employed, and significant applications of these ideas to problems extant in the human condition.

In the context of this model, education can be considered an applied field, deriving its methods of inquiry, concepts, generalizations

and theories from the fundamental disciplines as well as the general areas of information.

Dr. Hill noted that there is little reason for attempting to support the notion of a single, all-embracing science of education. He quoted Conant:

> "Teachers, like physicians, think in terms of predictive generalizations as well as arguments derived from general principles. Some people would like to combine these two modes of thought and speak of a single, all-embracing science of education. The question is whether it is useful to try to cover with the word 'science' a vast field of human activity directed toward practical ends. I have come to the conclusion that it is not... I prefer not to speak of the science of engineering but of the engineering sciences. I doubt that there is or ever will be a science of medicine, yet I am sure enormous strides forward have been made in the medical sciences. Therefore, I think it would be better to discuss...what might be called the 'educational sciences' or educational disciplines' rather than the science or discipline of education".[3]

The Educational Sciences

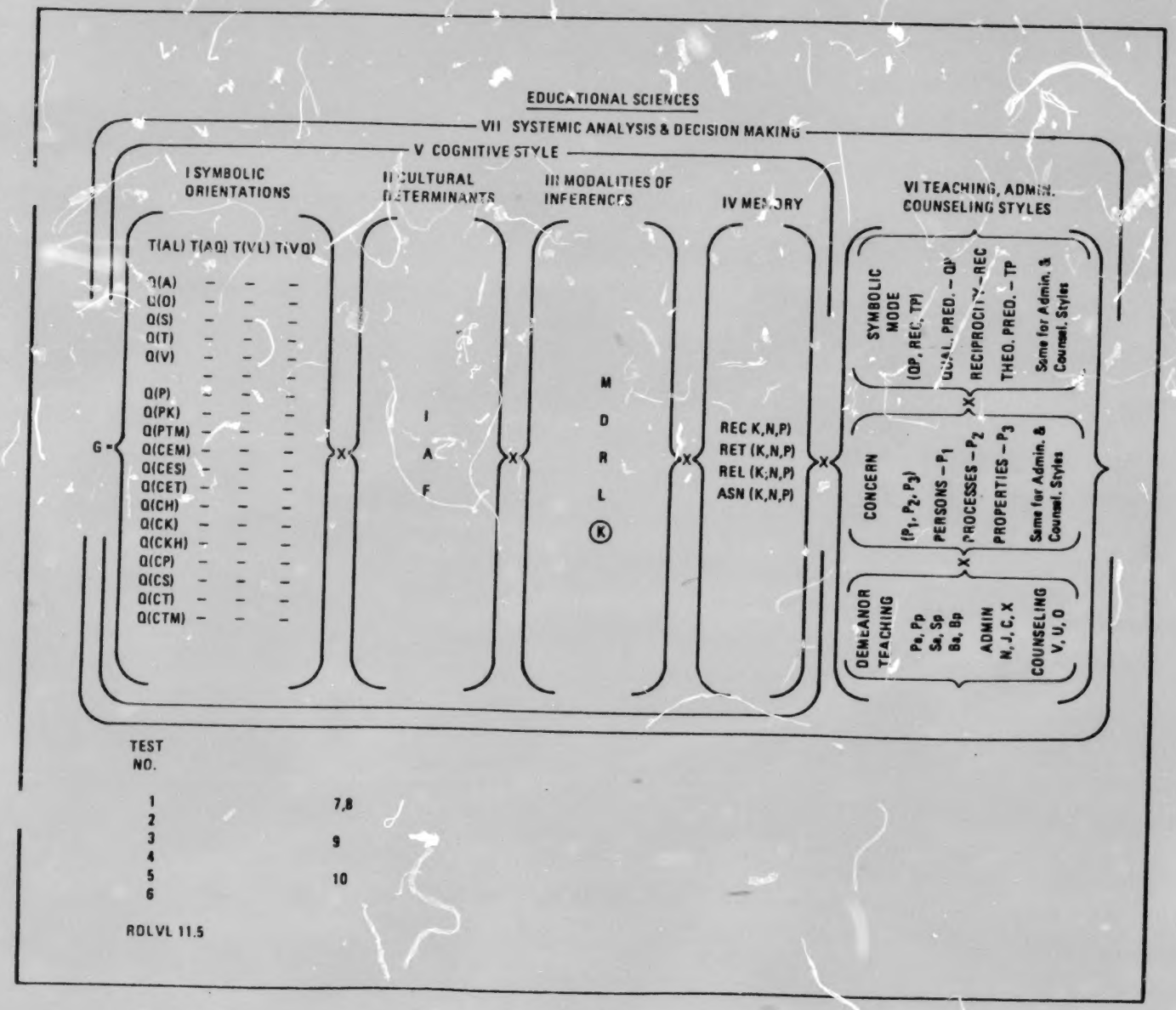
"In the process of creating and developing the Educational Sciences, the following assumptions are made:

1. Education is the process of searching for meaning.
2. Thought is different from language.
3. Man is a social creature with a unique capacity for deriving meaning from his environment through the creation and use of symbols.
4. Not content with biological satisfactions alone, man continually seeks meaning.

These assumptions are essential to the conceptual framework for education called the Educational Sciences."[4]

As formulated by Dr. Hill, there are seven Educational Sciences, each having its own factual descriptions, concepts, generalizations and principles. Although each one can be considered a "science" in its own right, each has limited utility in isolation. The Educational Sciences should be considered in the context of a total system, with interrelation-

ships and continuities.



It is not the purpose of this paper to examine the Educational Sciences in detail. However, an overview may be useful.[5]

There are several ways of looking at the Educational Sciences. One way is to consider education as a social system involving the generic elements of persons, processes and properties and their interconnections. An analysis of this system shows that there are seven aspects or strata fundamental to its existence. These seven strata are used to construct a conceptual framework unique to the applied field of education.

First Educational Science: Symbols and their Meanings.

Another way is to view education as a journey to the universe of meaning. As the individual starts his search for meaning he encounters stimuli which impinge on his nervous system. They come in forms of symbols. A symbol is only a conveyor of meaning. There are two kinds of symbols: theoretical and qualitative.

Theoretical symbols are words and numbers. They are spoken (or heard) written (or read).

Qualitative symbols are used to derive a variety of meanings from the environment as well as such personal experiences as feelings, values and self insights. Five of the qualitative symbols are associated with sensory stimuli and three are programmatic in nature; the remaining are associated with cultural codes.

As it is impossible to search for meaning without using one or both of these symbolic forms, the body of information pertaining to the first Educational Science is basic to the other six Educational Sciences.

Second Educational Science: Cultural Determinants of the Meanings of Symbols

Once the individual becomes aware of these symbols, he asks the question: "What does that symbol mean?" He then begins a search for meaning in a way which is unique to him: takes the symbol and sorts it through a cultural maze.

In the associate pattern (A), an individual will take meaning from his peer group or associates. The individualistic determinant (I)

will cause him to seek meaning in terms of his individual needs and purposes. The familial pattern (F) will derive meaning from the family circle or authority figure.

Third Educational Science: Modalities of Inference

In his quest for meaning, the individual begins to hypothesize about the meanings of the symbol. Tentative conclusions are tested by mental processes or inference patterns which are characteristic of a particular individual.

The individual may follow an inductive method by using a magnitude pattern(M) which is characterized by an appeal to rules, regulations or traditions. This is a form of "categorical thinking" essential to the successful study of mathematics. Or he may follow a difference pattern (D) which suggests a tendency to think in terms of one-to-one contrasts or comparisons of selected characteristics or measurements. Artists, creative writers and musicians often possess this modality. He may use a relationship pattern (R) which indicates the ability to synthesize a number of dimensions or incidents into a unified meaning or through analysis of a situation to discover its component parts. The appraisal modality (L) is employed by an individual who uses all three of the modalities (M,D,R), giving equal weight to each in his reasoning process. Such individuals tend to analyze, question or appraise an issue carefully before making a decision. The individual may follow the deductive inferential process (K) which indicated the use of logical proof as in geometry or in syllogistic reasoning.

Fourth Educational Science: Biochemical and electrophysiological Aspects of Memory

The functions of memory, including the processes of recognition, retention, recall and association included in this science are presently being researched.

These four Educational Sciences are essential to the educative process. They have direct implications to the diagnosis of learner abilities and the selection of instructional prescriptions to maximize student potentials.

Fifth Educational Science: Cognitive Styles of Individuals

This is composed of the four preceding sciences. These five sciences are not in themselves a complete explanation of all the activities occurring in the applied field of education.

Sixth Educational Science: Teaching, Administrative and Counselling Styles

This science may be viewed as the way in which an individual translates to others the meanings he has reached through his cognitive style.

Seventh Educational Science: Systemic Analysis Decision-Making

This provides a model for analysis of educational activities considered as systems, as well as for decision-making regarding that system. It provides alternative choices for optimal decisions based on statements of goals, definitions of tasks to be accomplished, conditions surrounding the tasks, and performance standards necessary for successful task accomplishment. This science also provides the human feedback circuitry needed to enhance the dynamic impact of people working directly with each other.

The seven educational sciences are basic elements required to develop a conceptual framework for the education profession. Every professional educator should be skilled in using information pertaining to symbols and meanings, perceptions, inferential patterns, the biochemistry of memory, individual cognitive styles, counselling, administrative and teaching styles of college personnel as well as systemic analysis-decision-making.

The study of these sciences will enable educators to approach a precision level enjoyed by medical practitioners, engineers and lawyers. With the development of the Educational Sciences, solutions of problems and explanations of phenomena will be facilitated, and educational problems caused by communication gaps, information misinterpretation, and fragmentation of effort will be alleviated.

This paper's primary objective is to stimulate discussion regarding the proposed framework for our profession as educators, but

the paper is also an invitation to participate in the activity started by Dr. Hill that has gained wide acceptance, especially in the Canadian and American community college systems.

NOTES

1. Educational Technology Magazine, February, 1966

2. Hill, Joseph E. The Educational Sciences, Oakland Community College Press, 1972

3. Conant, James B. The Education of American Teachers, McGraw-Hill Book Co.: New York, 1960, p. 120

4. Hill, ibid.

5. see T. Sutton & J. Wyett, Language for Education: An Overview of the Educational Sciences, Oakland Community College Press, 1971

Further sources of information:

1. Report: Exploratory Study in Cognitive Style Mapping at Canadore College B.T.S.D. Program prepared by A.E. Jimenez Ministry of Colleges and Universities. (Ontario) c/o Gerry H. Wright

2. The Educational Sciences - A Bibliography with Commentary compiled by J. Berry & T. Sutton.
The American Education Sciences Association,
1300 Grove St., Royal Oak, Mich., 48068

THE EDUCATIONAL SCIENCES

Joseph E. Hill

President, Oakland
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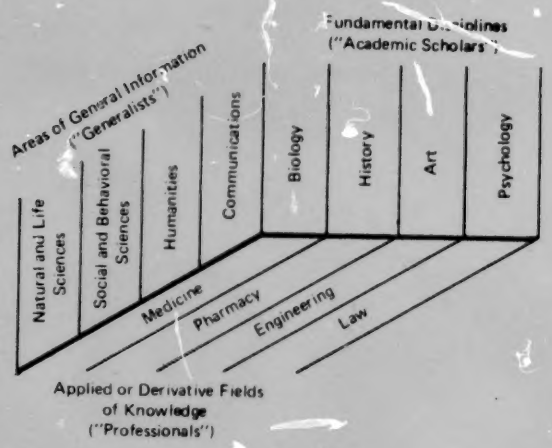
Fundamental disciplines are bodies of knowledge generated by communities of scholars that produce pure and distinctive forms of information about phenomena which they study. Biology, history, art, psychology and mathematics are examples of fundamental disciplines.

A fundamental discipline must be either a science or an art; it cannot be both. Sciences, as bodies of information, must recognize the principles of completeness and that of closure. The arts (e.g., history, a synoptic art, and art, and esthetic art) do not need to recognize these two principles.



Complementing the fundamental disciplines are the applied or derivative fields of knowledge. These bodies of information are generated by practitioners who deal with practical considerations of the human condition. Medicine, pharmacy, engineering and law are examples of applied fields of knowledge.

The applied fields are composed of terms and methods of inquiry borrowed from the fundamental disciplines. Their practitioners are not concerned with producing pure and distinctive forms of information. In this context, the applied fields are composed of both sciences and arts that are designed to explain phenomena and solve problems in the practical aspects of the human situation. For example, the applied fields of knowledge called "medicine" is composed of the medical sciences and the medical arts; "engineering", of the engineering sciences and the engineering arts.

Much of the knowledge produced by academicians in their disciplines and professionals in their "fields" is frequently beyond the comprehension of persons outside the specializations in question. Although this knowledge may appear at times to have little relevance to the immediate concerns of persons not committed to it by affiliation with these specializations, there is a great need for at least knowing about the structures and functions of such bodies of information. In order to make such information available to society, clusters of information related to such broad areas as natural and life sciences, social and behavioral sciences, humanities, and communications can be formed on the basis of representative ideas, methods of inquiry employed, and significant applications of these ideas to problems extant in the human condition.

The areas of general information provide a means for presenting the fundamental disciplines and the applied fields of knowledge in forms that will allow persons to realize the essentiality of these disciplines and fields to their own, and to contemporary society's ultimate potential and welfare. The aim of the areas of general information is to present selected characteristics in logical patterns of the fundamental disciplines and applied fields to which they pertain. The organization of ideas included in an area of general information is based upon making relevant to the education of any person, rather than to the education of the student specializing in a given body of knowledge, essential understandings of the disciplines and fields under consideration.

The Educational Sciences provide a conceptual framework and scientific language for the applied field of knowledge called education. These "sciences" approach a level of precision that is found in such other derivative fields as medicine, pharmacy, engineering and law.

With the development of the Educational Sciences, the solutions of problems and explanations of phenomena are facilitated, and educational problems accruing to inadequate communication, misinterpretation of information, and fragmentation of effort are alleviated.

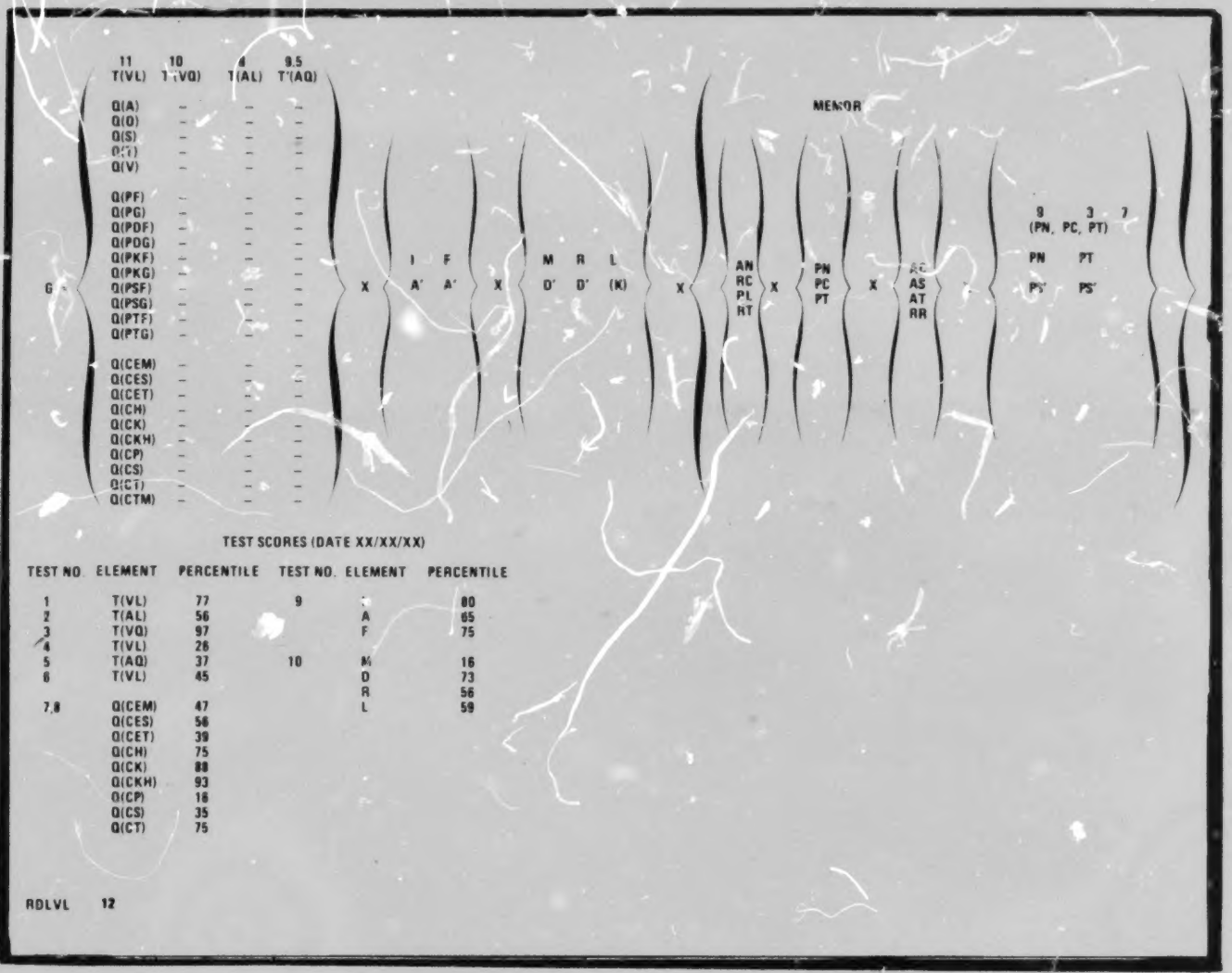
In the process of creating and developing the Educational Sciences, the following assumptions are made:

1) Education is the process of searching for meaning.
2) Thought is different from language.
3) Man is a social creature with an unique capacity for deriving meaning from his environment and personal experiences through the creation and use of symbols.
4) Not content with biological satisfactions alone, man continually seeks meaning.

These assumptions are essential to the conceptual framework for education called the "Educational Sciences".

At the present time, there are seven educational sciences:

1) Symbols and their meanings.
2) Cultural determinants of the meanings of symbols.
3) Modalities of inference.
4) Biochemical and electrophysiological aspects of memory-concern.
5) Cognitive styles of individuals.
6) Teaching styles, administrative styles and counselling styles.
7) Systemic analysis decision-making.



TEST SCORES (DATE XX/XX/XX)

TEST NO.	ELEMENT	PERCENTILE	TEST NO.	ELEMENT	PERCENTILE
1	T(VL)	77	9	[illegible]	80
2	T(AL)	56		A	65
3	T(VQ)	97		F	75
4	T(VL)	26			
5	T(AQ)	37	10	M	16
6	T(VL)	45		D	73
				R	56
7,8	Q(CEM)	47		L	59
	Q(CES)	56			
	Q(CET)	39			
	Q(CH)	75			
	Q(CK)	88			
	Q(CKH)	93			
	Q(CP)	16			
	Q(CS)	35			
	Q(CT)	75			

RDLVL 12

Educational Cognitive Style

Oakland Community College accepts the premise that no two students seek meaning in exactly the same manner. We believe that 90 per cent of the students with normal ability can learn 90 per cent of the material 90 per cent of the time, if the teaching methods and media are adjusted to the student's educational cognitive style. The College maps the cognitive style of each student to provide a picture of the various ways in which he searches for meaning. Each student has his own cognitive style or way of seeking meaning or knowing.

An individual's cognitive style is determined by the way he takes note of his total surroundings — how he seeks meaning, how he becomes informed. Is he a listener or a reader? Is he concerned only with his own viewpoint or is he influenced in decision-making by his family or associates? Does he reason mathematically, logically, or analytically?

These are but a few examples of the facets of human makeup that are included in a student's cognitive style. Family background, life experiences, and personal goals make each of us unique. Each map reflects each student's cognitive style. A cognitive map provides a picture of the diverse ways in which an individual acquires meaning. It identifies his cognitive strengths and weaknesses. This information can be used to build a personalized program of instruction.

Results from a battery of tests and inventories are processed through the College's computer system to produce a map of cognitive traits that describe the many ways each student might seek meaning. Cognitive maps are printed out in the form of a cartesian product of three sets. The first set indicates a student's tendency to use certain types of symbols, his ability to understand words and numbers, qualitative sensory symbols, qualitative programmatic symbols, and qualitative codes. The second set indicates influences which the student brings to bear in deriving meaning from symbols. These influences are affected mainly in terms of his own individuality (I), or his associates' (A) perceptions, or those of his family (F). The third set indicates the manner in which he reasons, or the way in which he infers; whether he

thinks in categories (M), or in terms of differences (D), or synthesizes multiple relationships (R), or uses all three (L), his modality of inference does influence, and is influenced by symbols and the cultural determinants he employs in his style. These three sets of elements, i.e., symbolic mediation, cultural determinants, and modalities of inference, comprise the cognitive style of the individual. A maximum of 2,560 different profiles of these elements are possible for an individual to show in his map at a given level of educational development.

Major Orientation/Minor Orientation

Major orientation is noted by capital letters. For example, T(VL) would indicate a major orientation in theoretical visual linguistic symbolic mediation. A major orientation is accorded a given element if it occurs in the 50th-99th percentile range of a distribution of that element at a given "developmental" level. The person showing a T(VL) in his cognitive style map at, say, the twelfth level of educational development would have realized a score which occurred somewhere within the range of the 50th-99th percentiles of the distribution of that element, T(VL) for persons at a twelfth level of educational development.

The symbol T'(AL), read "T prime AL", indicates a minor orientation in this element of style. If T'(AL) were indicated in an individual's cognitive style map, it would mean that he had realized a score for this element that occurred in the range of the 26th-49th percentiles, inclusively, of a distribution of scores for that element at a given level of educational development.

If an individual realized a score that occurred in the 25th percentile or below of a distribution of scores for a given element, at a given level of educational development, he is said to have a negligible orientation and the symbol for that element is omitted from the individual's cognitive style map.

There follows a description of the seven Educational Sciences.

THE SEVEN EDUCATIONAL SCIENCES

I - Symbols and their Meanings

Two types of symbols, theoretical (e.g., words and numbers) and qualitative (e.g., sensory, programmatic, and codes), are created and used by individuals to acquire knowledge and derive meaning from their environments and personal experiences. Theoretical symbols present to the nervous system, and then represent to it, something different from that which they themselves are. For example, the spoken word "cup" is an auditory sensation which represents to the individual hearing it the physical object of a cup. Since this auditory sensation (the sound "cup") presents to the individual's nervous system something different from that which it (the symbol) itself is, it is called a "theoretical auditory linguistic symbol". In the visual dimension, the imagery resulting from the individual's observing the printed word "cup", which would present to the awareness of the individual the same physical object that the word "cup" would produce, is an example of theoretical visual linguistic symbolic mediation.

Qualitative symbols present and then represent to the nervous system of the individual that which they (the symbols) themselves are to that individual. Meanings for qualitative symbols are derived from three sources: 1) sensory stimuli; 2) cultural codes (games); and 3) programmatic effects of objects which convey an almost automatic impression of a definite series of images, scenes, events or operations. At the present time, there are 20 qualitative symbols included in the "symbolic" set; five of them associated with sensory stimuli, five that are programmatic in nature, and ten associated with cultural codes.

There are two main types of theoretical symbols — auditory and visual — each of which can be divided into linguistic and quantitative elements. The four theoretical symbols are defined as follows:

T(VL) Theoretical Visual Linguistics - ability to find meaning from words you see. A major in this area indicates someone who reads with a better than average degree of comprehension.

T(AL) Theoretical Auditory Linguistics - ability to acquire meaning through hearing spoken words.

T(VQ) Theoretical Visual Quantitative - ability to acquire meaning in terms of numerical symbols, relationships, and measurements.

T(AQ) Theoretical Auditory Quantitative - ability to find meaning in terms of numerical symbols, relationships, and measurements that are spoken.

The five qualitative symbols associated with sensory stimuli are:

Q(A) Qualitative Auditory - ability to perceive meaning through the sense of hearing. A major in this area indicates ability to distinguish between sounds, tones of music, and other purely sonic sensations.

Q(O) Qualitative Olfactory - ability to perceive meaning through the sense of smell.

Q(S) Qualitative Savory - ability to perceive meaning by the sense of taste. Chefs should have highly developed qualitative olfactory and savory abilities.

Q(T) Qualitative Tactile - ability to perceive meaning by the sense of touch, temperature, and pain.

Q(V) Qualitative Visual - ability to perceive meaning through sight.

The qualitative symbols that are programmatic in nature are:

Q(PF) Qualitative Proprioceptive (Fine) - ability to synthesize a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., playing a musical instrument, typewriting); or into an immediate awareness of a possible set of inter-relationships between symbolic mediations, i.e., dealing with "signs". While qualitative proprioceptive fine symbolic intelligence is most readily observable in seemingly automatic motor responses such as reading and playing music, certain types of theoretical symbolic mediation also require qualitative proprioceptive activity. For example, the

synthesis of a number of symbolic mediations is evident when an individual upon seeing a sign of smoke immediately interprets it as evidence of fire and experiences an interplay of many sensations including smell of smoke, taste of smoke, and sensation of heat. In this instance a network of previous experiences and related associations produces the theoretical mediation of fire along with the other qualitative aspects.

Q(PG) Qualitative Proprioceptive (Gross) - ability to synthesize a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball, skiing).

Q(PDF) Qualitative Proprioceptive Dextral (Fine) - a predominance of right-eyed, right-handed and right-footed tendencies (a typically right-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., writing right-handed).

Q(PDG) Qualitative Proprioceptive Dextral (Gross) - a predominance of right-eyed, right-handed and right-footed tendencies (a typically right-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball with the right hand).

Q(PKF) Qualitative Proprioceptive Kinematics (Fine) - ability to synthesize a number of symbolic mediations into a performance demanding the use of fine musculature while monitoring a complex physical activity involving motion.

Q(PKG) Qualitative Proprioceptive Kinematics (Gross) - ability to synthesize a number of symbolic mediations into a performance demanding the use of gross musculature while monitoring a complex physical activity involving motion.

Q(PSF) Qualitative Proprioceptive Sinistral (Fine) - a predominance of left-eyed, left-handed and left-footed tendencies (a typically left-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., writing left-handed).

Q(PSG) Qualitative Proprioceptive Sinistral (Gross) - a predominance of left-eyed, left-handed and left-footed tendencies (a typically left-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball with the left-hand).

Q(PTF) Qualitative Proprioceptive Temporal (Fine) - ability to synthesize a number of symbolic mediations into a performance demanding the use of fine musculature while monitoring a complex physical activity involving timing.

Q(PTG) Qualitative Proprioceptive Temporal (Gross) - ability to synthesize a number of symbolic mediations into a performance demanding the use of gross musculature while monitoring a complex physical activity involving timing.

The remaining ten qualitative symbols associated with cultural codes are defined as:

Q(CEM) Qualitative Code Empathetic - sensitivity to the feelings of others; ability to put yourself in another person's place and see things from his point of view.

Q(CES) Qualitative Code Esthetic - ability to enjoy the beauty of an object or an idea. Beauty in surroundings or a well-turned phrase are appreciated by a person possessing a major strength in this area.

Q(CET) Qualitative Code Ethic - commitment to a set of values, a group of principles, obligations and/or duties. This commitment need not imply morality. Both a priest and a criminal may be committed to a set of values although the "values" may be decidedly different.

Q(CH) Qualitative Code Histrionic - ability to exhibit a deliberate behavior, or play a role to produce some particular effect on other persons. This type of person knows how to fulfill role expectations.

Q(CK) Qualitative Code Kinesics - ability to understand, and to communicate by non-linguistic functions such as facial expression and motions of the body (e.g., smiles and gestures).

Q(CKH) Qualitative Code Kinesthetic - ability to perform motor skills, or effect muscular coordination according to a recommended, or acceptable, form (e.g., bowling according to form, or golfing).

Q(CP) Qualitative Code Proxemics - ability to judge the physical and social distance that the other person would permit, between oneself and that other person.

Q(CS) Qualitative Code Synnoetics - personal knowledge of oneself.

Q(CT) Qualitative Code Transactional - ability to maintain a positive communicative interaction which significantly influences the goals of the persons involved in that interaction (e.g., salesmanship).

Q(CTM) Qualitative Code Temporal - ability to respond or behave according to time expectations imposed on an activity by member in the role-set associated with that activity.

II.- Cultural Determinants

There are three cultural determinants of the meaning of symbols: 1) individuality (I), 2) associates (A), and 3) family (F). It is through these "determinants" that cultural influences are brought to bear by the individual on the meanings of symbols. The "individuality" influence is frequently reflected by the individual's need to quote definitions, or explain situations, in his own words. The "associates" influence is frequently evidenced by an individual who understands that which is under consideration, but explains or discusses these matters mainly in the words of his associates who may be involved with him in the situation. The "family" determinant is frequently portrayed by the individual possessing it through examples he may use in explaining a situation or solving a problem (e.g., either parents, children, wife, husband, sibling, cousin, etc., are used to illustrate a situation analogous to the one under consideration).

III.- Modalities of Inference

The third set of the cartesian product indicating cognitive style includes elements which indicate the individual's modality of inference, i.e., the form of inference he tends to use.

M — Magnitude - a form of "categorical reasoning" that utilizes norms or categorical classifications as the basis for accepting or rejecting an advanced hypothesis. Persons who need to define things in order to understand them reflect this modality.

D — Difference - this pattern suggests a tendency to reason in terms of one-to-one contrasts or comparisons of selected characteristics or measurements. Artists often possess this modality as do creative writers and musicians.

R — Relationship - this modality indicates the ability to synthesize a number of dimensions or incidents into a unified meaning, or through analysis of a situation to discover its component parts. Psychiatrists frequently employ the modality of relationship in the process of psychoanalyzing a client.

L Appraisal - is the modality of inference employed by an individual who uses all three of the modalities noted above (M,D, and R), giving equal weight to each in his reasoning process. Individuals who employ this modality tend to analyze, question, or, in effect, appraise that which is under consideration in the process of drawing a probability conclusion.

K Deductive - indicates deductive reasoning, or the form of logical proof used in geometry or that employed in syllogistic reasoning.

IV.- Memory-Concern

The process of memory-concern is composed of two sets of information pertaining to: 1) the memory function, and 2) concern components. The memory function is a complex one composed of four processes: a) recognition, (RN), b) retention, (RT), c) recall, (RL), and d) association, (AN). The concern components are: a) persons, (PN), b) processes, (PS), and c) properties, (PT).

The memory-concern process is an essential aspect of an individual's cognitive style. Recent work by biochemists and psychobiologists provides information by which the memory function can be expressed in terms of selected biochemical elements and the electrophysiological measurements of alpha (α), beta (β), theta (θ), and delta (δ) waves, respectively. The concern components of persons (PN), processes (PS), and properties (PT), respectively, are considered to contribute to the biochemical elements produced by memory activity and conditions reflected in the electrophysiological measurements, i.e., α, β, θ, and δ. For example, some individuals find it easier to remember persons (PN), thereby expending less energy (a major orientation indicating a condition of potential energy, or "easy" memory) in the memory activity than they would for, say, remembering processes (PS). Situations in which individuals witness difficulty in exercising the process of memory are indicated by a negligible orientation (i.e., the element is not shown in the map) in either one or a combination of the processes of recognition, retention, recall and association. The

minor orientation is used to indicate a condition of "neutral energy expenditure" in one, or in a combination of the four processes of memory, when specimens of body fluids shows an average count of residuals of biochemical elements considered to be at work in memory-concern activity.

Recent work by biochemists and psychobiologists differentiates between short-term and long-term memory. Short-term memory must be present, however, before long-term memory can occur. Short-term memory may become long-term memory with the production of proteins and an increase in enzymatic activity levels in the brain cells. Short-term memory is currently thought to be the result of short-lived processes.

Recent experiments with animals have shown that injection of stimulators into the central nervous system can have an affect on both short-term and long-term memory, respectively. Differential effects on memory resulting from chemical injections have also been observed between human subjects. Implications for education in the future might well lie in the use of immediate memory stimulators and other chemicals to increase the attention span and decrease protein elements which inhibit the memory-concern function.

V.- Cognitive-Style

The Educational Science of cognitive style combines the information included in the first four "sciences," by means of a cartesian product of these four sets, to provide a picture of the profiles distributed over the four sets that an individual employs in seeking meaning. These profiles reflect the cognitive style "strengths" of the individual, and are vehicles for determining educational prescriptions to help him in the educative process.

At the present time, individuals are being tested and inventoried for elements included in the first three sets only, i.e., symbols and their meanings, cultural determinants, and modalities of inference. Instruments for collecting information relative to the memory-concern set are currently under construction.

VI.- Teaching, Counseling and Administrative Styles

Each of these three styles is represented by a cartesian product of three sets of information pertaining to: 1) demeanor, 2) emphasis, and 3) symbolic modes of presentation, or communication.

Demeanor x Emphasis x Symbolic Mode.

Elements in the emphasis set and the symbolic modes set, respectively, are common to each of the three styles. Differentiation between an individual's teaching style, his counseling style and his administrative style in these dimensions ("emphasis" and "mode") is affected through the change in orientations (major and minor) that might occur with each style. For example, an individual may show a major orientation in processes (PS) in his teaching style while indicating a major orientation in persons (PN) in his administrative style.

Teaching Style

The demeanor set of teaching style includes three elements: 1) predominant (P_{ap}), 2) adjustive or "switcher" (S_{ap}), and 3) flexible (B_{ap}). These three demeanor classifications can occur as either a major orientation in one with minor orientations in the other two, or two major orientations with a minor in the remaining element. Each of these elements is subscripted as authoritarian (a) or permissive (p). An authoritarian type is an individual who respects the wishes and decisions of persons in superordinate positions relative to his own, and expects his wishes and decisions to be respected when he assumes the superordinate role. A permissive individual is one who does not exercise this "respect" and does not expect it to be exercised by others regarding his role. The orientations in the demeanor set are combined with those of the emphasis and the "symbolic mode" set (QP - Qualitative Predominant; RP - Reciprocity; TP - Theoretical Predominant) to form profiles indicating the teaching style of an individual. An example of a Teaching Style represented by a cartesian product is shown below:

$$\begin{Bmatrix} Pa \\ S'p \end{Bmatrix} \times \begin{Bmatrix} PT \\ PC' \end{Bmatrix} \times \begin{Bmatrix} TP \\ RP' \end{Bmatrix}$$

Counseling Style

The cognitive style of individuals involved in counseling situations, as in the case of teaching and administrative styles, is important but does not provide a total explanation of the behavior of counselors. The demeanor elements of counseling style expressed in terms of major and minor orientations involving: a) directive (V,v), b) situational (U,u), or c) non-directive (O,o), are determined on the basis of the counselor's attitude toward who should set the goals and determine the approaches to the goals in the counseling situation. The counselor who reflects "my goals my way", regardless of the counseling situation, is given a major orientation in the directive element in the demeanor set. Counselors who are at times directive and at other times non-directive, depending upon the situation, are accorded major orientations in the situational element. Counselors who tend not to direct behavior, regardless of the counseling situation, are accorded major orientations in the non-directive element. The total counseling style of an individual is expressed in terms of profiles showing major and minor orientations distributed over the three set of demeanor, emphasis and "symbolic mode". An example of Counseling Style is shown below:

$$\left\{ \begin{matrix} U \\ V' \end{matrix} \right\} \times \left\{ \begin{matrix} PN & PT \\ PC' & PC' \end{matrix} \right\} \times \left\{ \begin{matrix} QP \\ RP' \end{matrix} \right\}$$

Administrative Style

Major and minor orientations in four elements of demeanor 1) dominant (N,n), 2) adjustive (J,j), 3) cooperative (C,c) and 4) passive custodial (X,x); major and minor orientations combined in the "emphasis elements": persons (PN), processes (PS), and properties (PT); along with major and minor orientations in the elements of symbolic mode (QP, RP, TP), for profiles that portray the administrative style of an individual. The dominant (N) administrator reflects a "my goals my way" approach, the adjustive (J) type reflects "my goals your way, or your goals my way" approaches; the cooperative (C) employs a demeanor of "our

goals our way"; while the passive custodial demeanor is one resulting from a "your goals your way" approach to administration by the individual. An example of Administrative Style is shown:

$$\left\{ \begin{matrix} N \\ J' \\ C' \end{matrix} \right\} \times \left\{ \begin{matrix} PT \\ PN' \end{matrix} \right\} \times \left\{ \begin{matrix} RP \\ TP' \end{matrix} \right\}$$

VII.- Systemic Analysis Decision-Making

A system is a defined collection of elements with their interconnections considered over a period of time. Any aspect of education may be considered as a system.

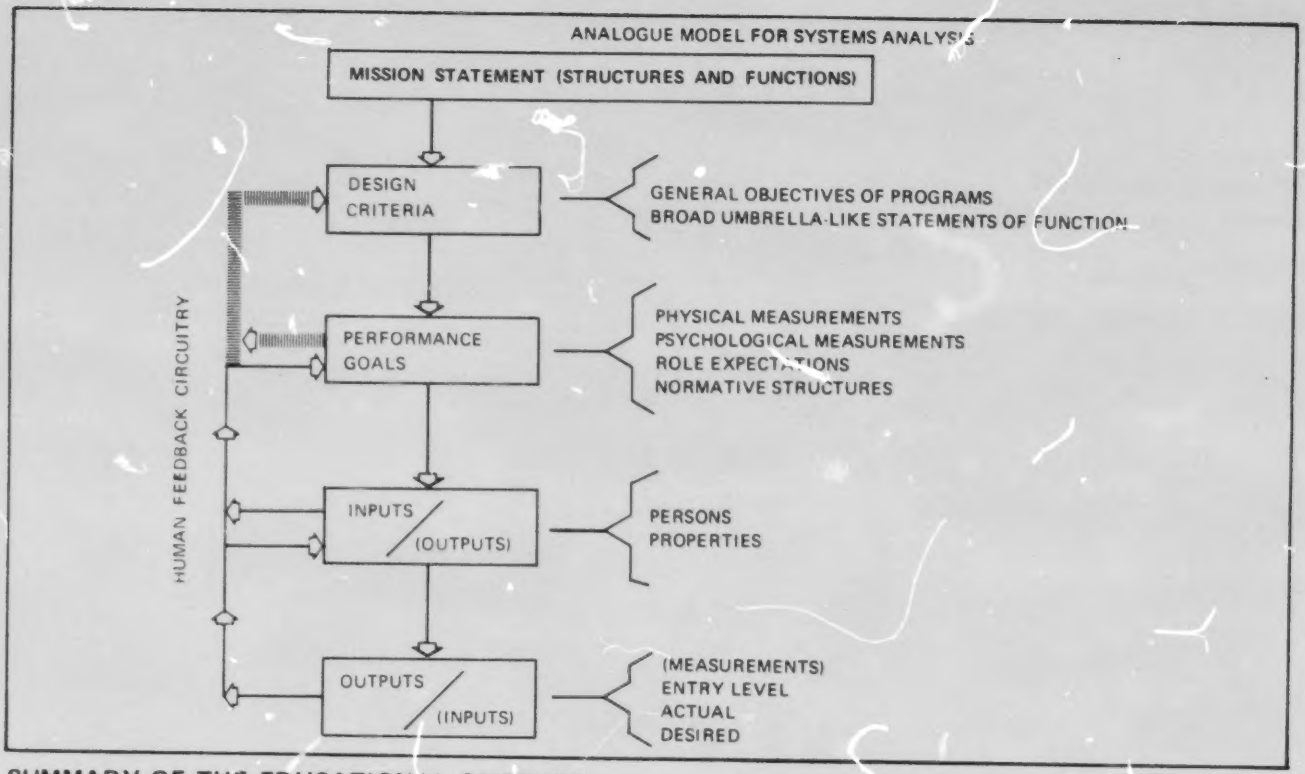
The basic purpose of systemic analysis is decision-making resulting in a choice of options available to the decision-maker. Analysis of a system is conducted in terms of determining how well the goals of a system are being met within the constraints of the inputs of the system, combined with considerations of its mission and the main functions (design criteria) around which the system is designed.

Performance goals must be stated in terms of the tasks to be accomplished, the conditions surrounding the tasks, and the minimum performance needed for successful accomplishment of the tasks. Any system may be defined, and analyzed, by means of the analogue model following.

For example, an educational program can be defined as a social system of the three generic elements: persons, processes and properties, and their interconnections considered over a period of time. This system can be defined by composing a mission statement for it, stating its design criteria, structuring performance goals for each criterion, and determining the inputs (persons and properties) necessary for achieving the tasks stated in the performance goals of the system.

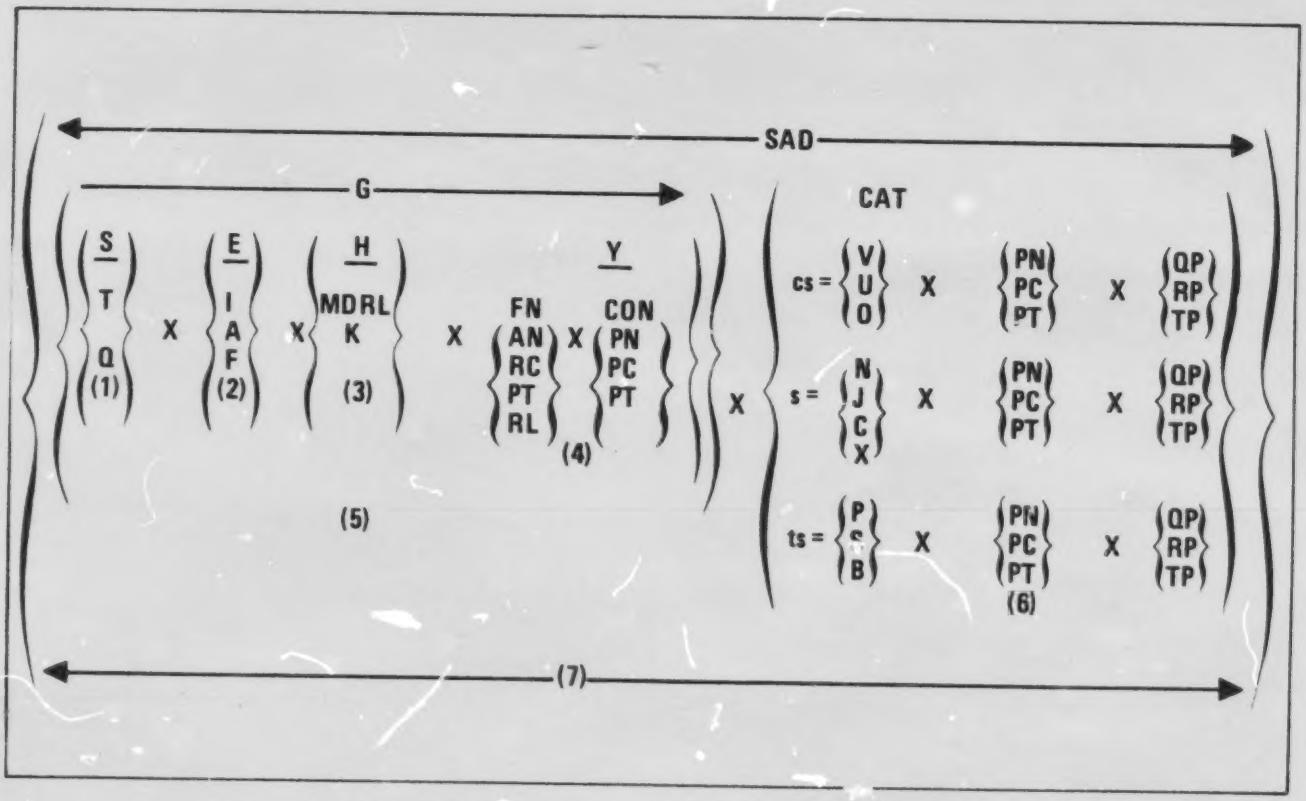
The outputs of a system are measurements of performances of persons, processes, and properties within the system as support functions (support variables); and as measurements and products resulting from the performance of these three elements toward fulfilling the mission of the system (impact variables).

Throughout the period of operation of the system, information is placed in the human feedback circuitry element, through meetings and conversations, in order to make decisions regarding possible modifications of elements and/or their interconnections to keep the system adjusted to its internal and external environments. The ultimate objective of systemic analysis is that of deriving optimal decisions, i.e., decisions that are "best" for all elements included in the decision. It should be noted that optimal decisions are not always "perfect" for each of the elements affected by the system.



SUMMARY OF THE EDUCATIONAL SCIENCES

Educational Sciences are summarized in the diagram shown here:

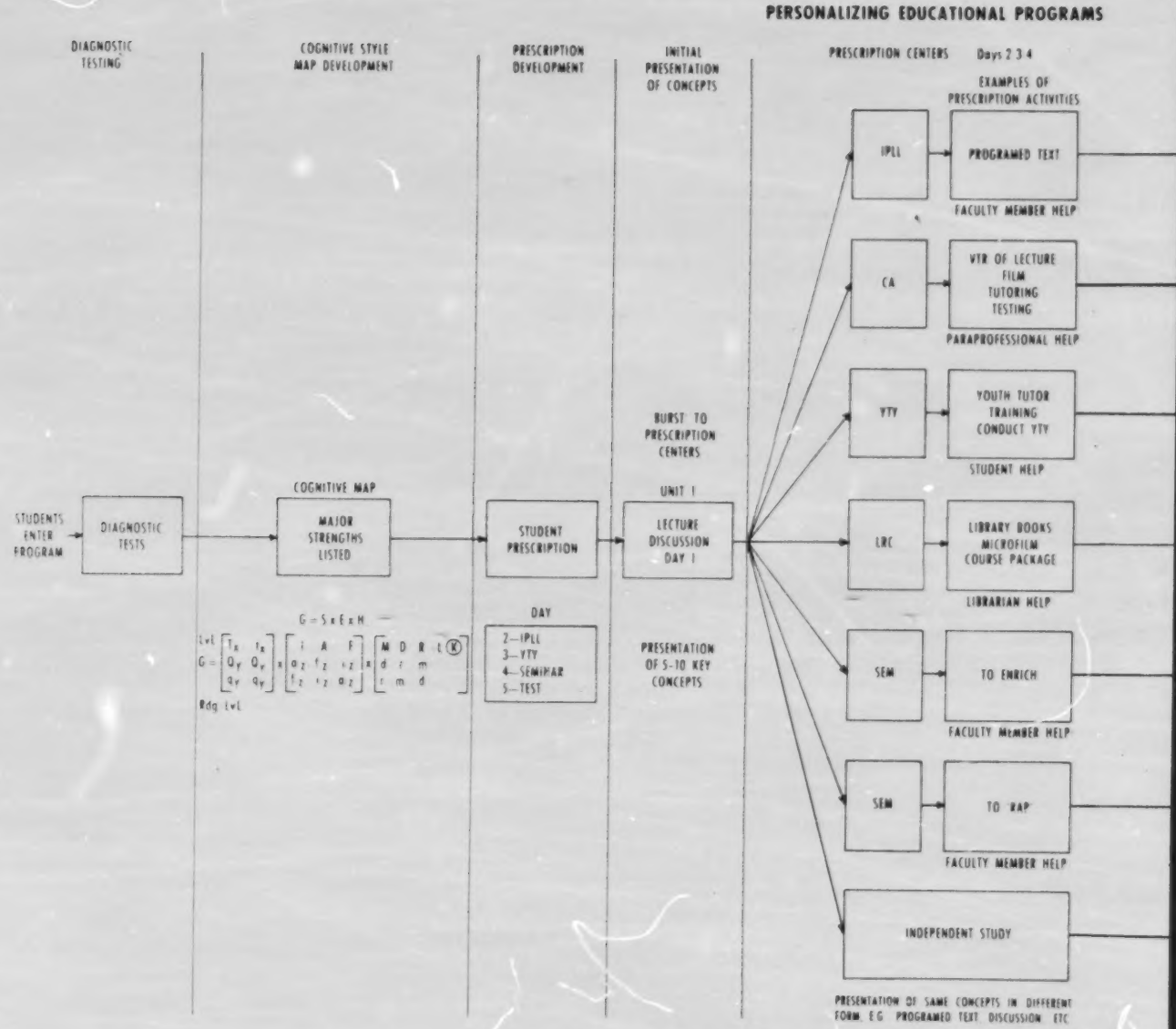


Personalized Education

A student's cognitive map presents a picture of the variety of profiles he uses in his education, i.e., that he uses in his search for meaning. Mapping an individual's cognitive style enables the educator to consider the individual in terms that without the map he might not have employed. The diagnosis of an individual's cognitive style and the modes of understanding required by an educational task can be used to match the student to the task. Through this approach it is possible to prescribe educational activities that provide a better probability of successful accomplishment by the individual than otherwise might be possible.

PEP

Flow Chart of Personalized Educational Program (PEP) Illustrating Student Progress From Diagnostic Testing Through Successful Completion of an Instructional Unit.



PERSONALIZING EDUCATIONAL PROGRAMS
UTILIZING COGNITIVE STYLE MAPPING

OCC
OAKLAND COMMUNITY COLLEGE

DR. JOSEPH E. HILL, PRESIDENT
DR. DEREK N. NUNNEY, VICE PRESIDENT

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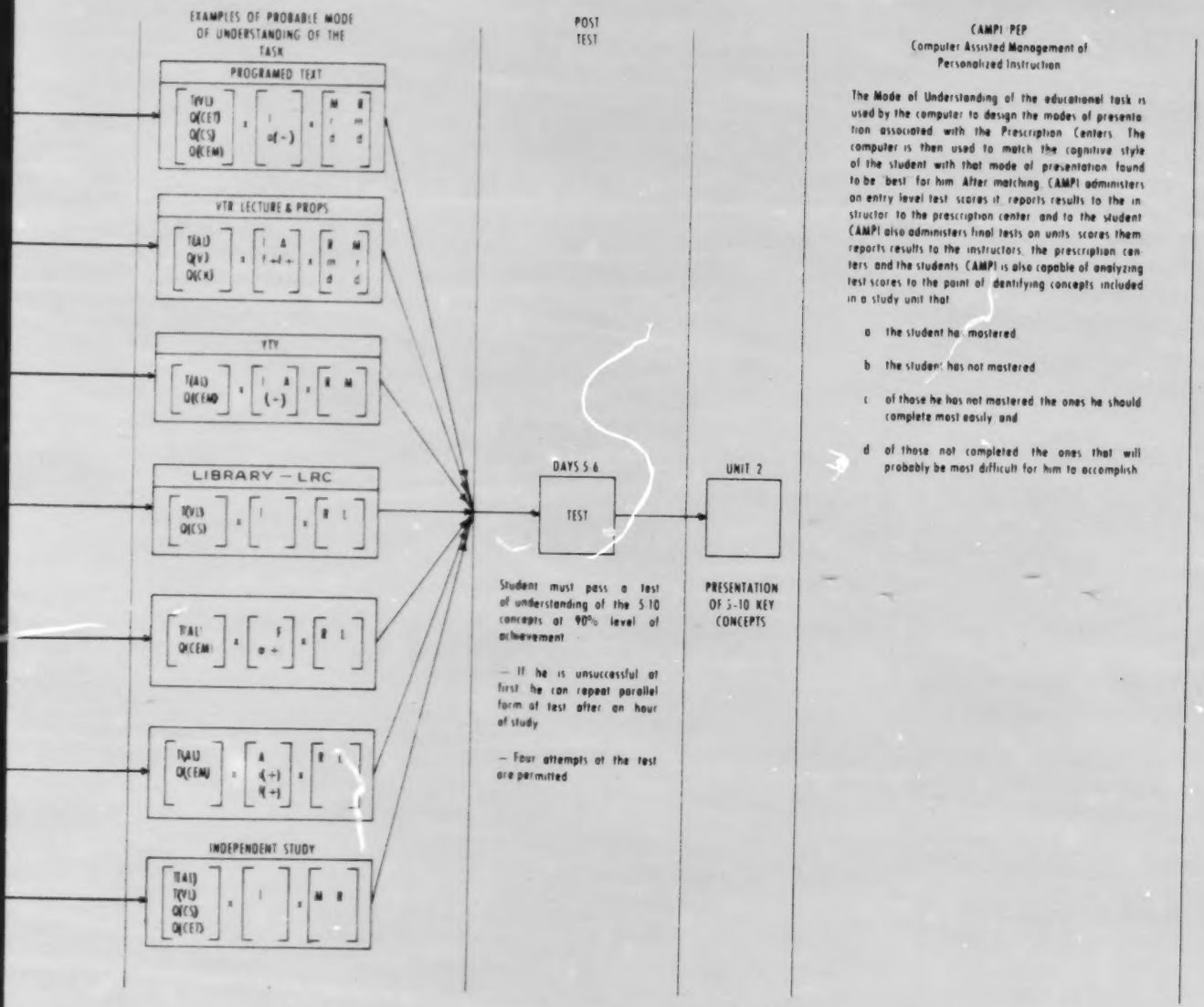
UTILIZING COGNITIVE STYLE MAPPING


EXAMPLES OF PROBABLE MODE OF UNDERSTANDING OF THE TASK
PROGRAMED TEXT
VTR LECTURE & PROPS
VTV
LIBRARY — LRC
INDEPENDENT STUDY
POST TEST
DAYS 5-6
TEST
UNIT 2
PRESENTATION OF 5-10 KEY CONCEPTS
Student must pass a test of understanding of the 5-10 concepts at 90% level of achievement
— If he is unsuccessful at first he can repeat parallel form of test after an hour of study
— Four attempts at the test are permitted

CAMPI/PEP
Computer Assisted Management of Personalized Instruction

The Mode of Understanding of the educational task is used by the computer to design the modes of presentation associated with the Prescription Centers. The computer is then used to match the cognitive style of the student with that mode of presentation found to be 'best' for him. After matching, CAMPI administers an entry level test scores it, reports results to the instructor to the prescription center and to the student. CAMPI also administers final tests on units, scores them, reports results to the instructors, the prescription centers and the students. CAMPI is also capable of analyzing test scores to the point of identifying concepts included in a study unit that

a the student has mastered

b the student has not mastered

c of those he has not mastered the ones he should complete most easily and

d of those not completed the ones that will probably be most difficult for him to accomplish

LES SCIENCES PEDAGOGIQUES

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LES SCIENCES PEDAGOGIQUES

1.0 LE STYLE D'APPRENTISSAGE SCOLAIRE

- 1.1 les orientations majeures et mineures
- 1.2 les symboles et leurs significations
  - 1.2.1 les quatre symboles théoriques
  - 1.2.2 les cinq symboles qualitatifs associés aux stimuli sensoriels
  - 1.2.3 les cinq symboles qualitatifs de caractère programmatique
  - 1.2.4 les dix symboles qualitatifs associés aux codes culturels
- 1.3 les déterminants culturels
- 1.4 les modes d'inférence
- 1.5 le complexe mémoire-intérêt
- 1.6 le profil d'apprentissage

2.0 LE STYLE D'ENSEIGNEMENT, DE CONSEIL ET D'ADMINISTRATION

- 2.1 le style d'enseignement
- 2.2 le style de conseil
- 2.3 le style d'administration

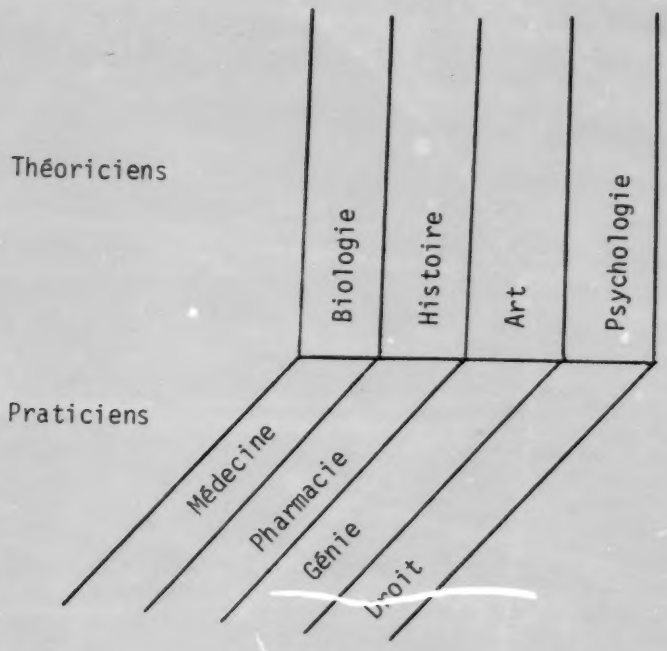
3.0 L'ANALYSE SYSTEMIQUE ET LA PRISE DE DECISION

4.0 L'EDUCATION PERSONNALISEE

Les disciplines fondamentales sont des corps de connaissances qui sont l'oeuvre de communautés scientifiques produisant des formes pures et distinctes d'information sur les phénomènes qu'ils étudient. La biologie, l'histoire, l'art, la psychologie et les mathématiques sont autant d'exemples de disciplines fondamentales.

Une discipline fondamentale doit être ou une science ou un art, elle ne peut être l'une et l'autre. Les sciences, comme corps d'information, obéissent aux principes de complétude et de fermeture. Les arts (l'histoire, art synoptique, et l'art au sens des beaux-arts) n'ont pas à respecter ces deux principes.

Disciplines fondamentales



Sciences appliquées ou dérivées

Les disciplines fondamentales trouvent leur complément dans les domaines de la connaissance appliquée ou dérivée. Ces corps d'information sont l'oeuvre de praticiens ayant affaire aux aspects pratiques de la

condition humaine. La médecine, la pharmacie, le génie et le droit sont autant de domaines de la connaissance appliquée.

Dans ces domaines, on a recours à des termes et à des méthodes d'enquête empruntés aux disciplines fondamentales. Les praticiens ne s'emploient pas à produire des formes pures et distinctes d'information. Dans le présent contexte, les disciplines appliquées comprennent des sciences et des arts visant à expliquer des phénomènes et à résoudre des problèmes inhérents aux aspects pratiques de la situation humaine. Par exemple, le domaine de connaissance appliquée appelé "médecine" comprend les sciences médicales et les arts médicaux, le génie, les sciences et les arts du génie.

Les sciences pédagogiques fournissent un cadre conceptuel et un langage scientifique au domaine de la connaissance appliquée appelé pédagogie. Ces "sciences" atteignent un niveau de précision comparable à celui d'autres domaines dérivés tels que la médecine, la pharmacie, le génie et le droit.

La mise au point des sciences pédagogiques a pour effet de faciliter la solution des problèmes et l'explication des phénomènes et de réduire les problèmes pédagogiques liés à l'insuffisance de la communication, à la mésinterprétation de l'information et à la dispersion des efforts.

Le processus de création et de mise au point des sciences pédagogiques repose sur les postulats suivants:

1. l'éducation est un processus consistant dans la recherche du sens.[1]
2. la pensée est distincte du language.
3. l'homme est un être social ayant la capacité unique de dégager du sens de son milieu et de ses expériences personnelles par la création et l'usage de symboles.

4. non content des seules satisfactions biologiques, l'homme est perpétuellement en quête de sens.

Les postulats précités sont essentiels au cadre conceptuel de la pédagogie appelé sciences pédagogiques.

Ces dernières sont actuellement au nombre de sept:

1. les symboles et leurs significations;
2. les déterminants culturels qui accompagnent les significations des symboles;
3. les modes d'inférence;
4. les aspects biochimiques et électrophysiologiques du complexe mémoire-intérêt;
5. les styles d'apprentissage des individus;
6. les styles d'enseignement, d'administration et de conseil;
7. l'analyse systémique et la prise de décision.

1.0 LE STYLE D'APPRENTISSAGE SCOLAIRE

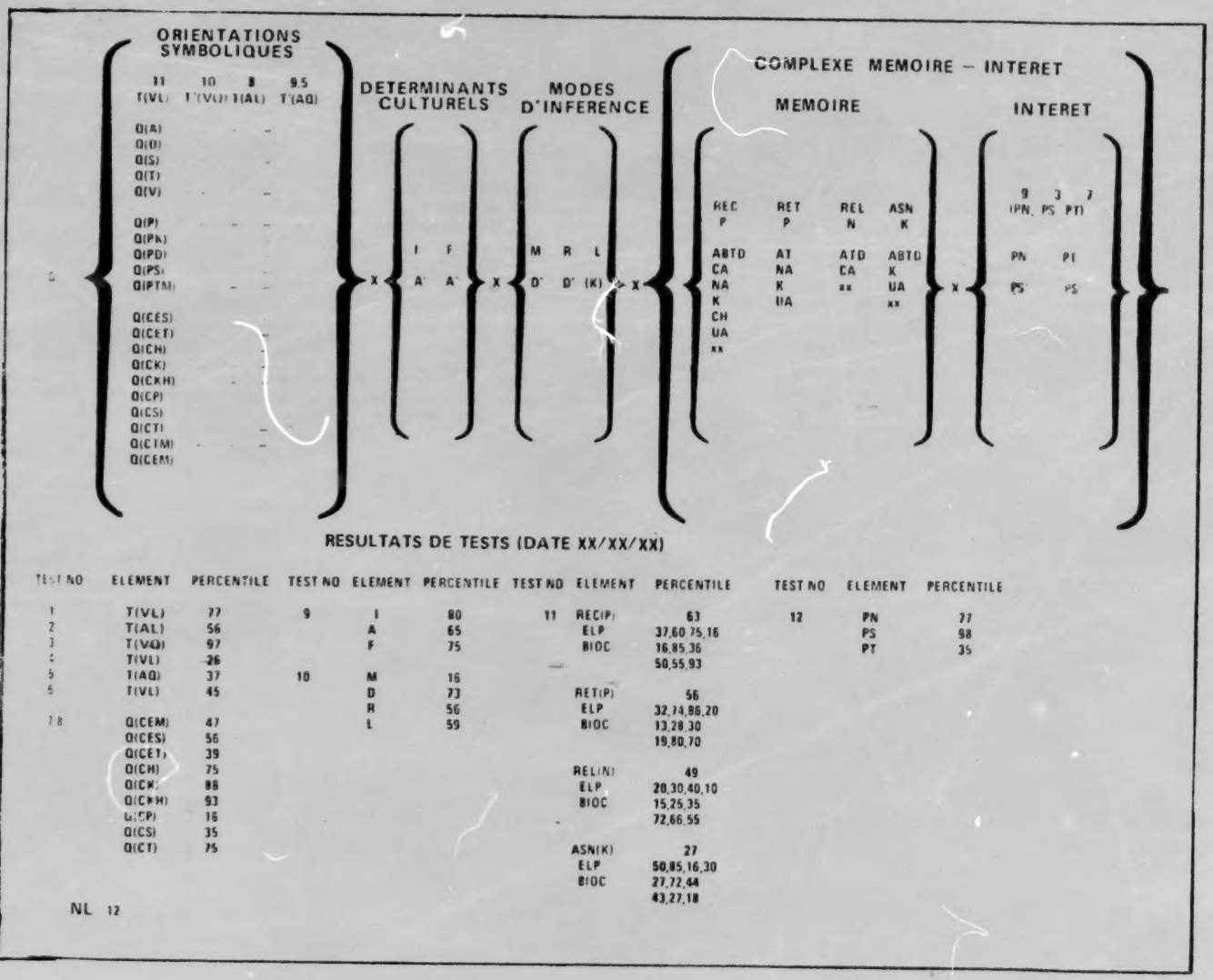
Le Oakland Community College admet d'entrée de jeu qu'il n'y a pas deux étudiants qui cherchent le sens exactement de la même façon. On croit que 90% des élèves normalement doués peuvent apprendre 90% de la matière les 90% du temps, dès lors que les méthodes et les moyens techniques d'enseignement sont ajustés au style d'apprentissage de chaque élève de façon à fournir une image des diverses façons dont il cherche le sens. Chacun a son propre style d'apprentissage ou sa façon de chercher le sens ou le savoir.

Le style d'apprentissage d'un individu est déterminé par la façon dont il prend conscience de tout ce qui l'entoure - dont il cherche le sens, acquiert l'information. Est-il du type auditeur ou liseur? S'en remet-il uniquement à son propre point de vue dans les prises de

décision ou se laisse-t-il influencer par sa famille ou ses associés? Raisonne-t-il en mathématicien, en sociologue ou en mécanicien d'automobile?

Ce ne sont là que quelques exemples des facettes constitutives de la personnalité qui sont comprises dans le style d'apprentissage d'un étudiant. Les antécédents familiaux, le talent, les expériences de la vie et les buts personnels font de chacun de nous un être unique. Chaque graphe, comme chaque étudiant, est distinct. Un graphe d'apprentissage livre une image complète des diverses façons dont un individu s'approprie du sens.[2] Il met en évidence ses points forts et ses points faibles en matière d'apprentissage. Pareille information peut servir à construire un programme d'instruction individualisée.

Les résultats d'une batterie de tests et d'inventaires font l'objet d'un traitement par le système d'informatique du Collège et aboutissent à un graphe d'apprentissage dont les traits correspondent aux nombreuses façons dont chaque étudiant est susceptible de rechercher du sens. Les graphes d'apprentissage sont imprimés sous forme d'un produit cartésien de trois ensembles. Le premier ensemble indique la tendance d'un élève à utiliser certains types de symboles, son habileté à comprendre mots et nombres, les symboles qualitatifs liés aux sens, les symboles qualitatifs d'ordre programmatique et les codes qualitatifs. Le deuxième ensemble indique les influences que l'étudiant met en jeu dans son interprétation des symboles. Ces influences dépendent principalement soit de sa propre individualité (I), soit des perceptions de ses associés (A), soit de celles de sa famille (F). Le troisième ensemble indique sa manière de raisonner ou d'inférer. Qu'il pense par catégorie (M) ou par différences (D) ou en synthétisant des relations multiples (R) ou encore de ces trois façons (L), son mode d'inférence influe sur les symboles et les déterminants culturels qu'il emploie dans son style et vice-versa. Ces trois ensembles d'éléments: médiation symbolique, déterminants culturels et modes d'inférence, composent le style d'apprentissage de l'individu. Un maximum de 2,560 combinaisons de tels éléments sont susceptibles de figurer dans le graphe d'un individu à un niveau donné de formation scolaire.



RESULTATS DE TESTS (DATE XX/XX/XX)

TEST NO	ELEMENT	PERCENTILE	TEST NO	ELEMENT	PERCENTILE	TEST NO	ELEMENT	PERCENTILE	TEST NO	ELEMENT	PERCENTILE
1	T(VL)	77	9	I	80	11	REC(P)	63	12	PN	77
2	T(AL)	56		A	65		ELP	37,60,75,16		PS	98
3	T(VQ)	97		F	75		BIOC	16,85,36		PT	35
4	T(VL)	26						50,55,93			
5	T(AQ)	37	10	M	16						
6	T(VL)	45		D	73		RET(P)	56			
				R	56		ELP	32,74,86,20			
7 8	O(CEM)	47		L	59		BIOC	13,28,30			
	O(CES)	56						19,80,70			
	O(CET)	39									
	O(CH)	75					REL(N)	49			
	O(CK)	88					ELP	20,30,40,10			
	O(CKH)	93					BIOC	15,25,35			
	O(CP)	16						72,66,55			
	O(CS)	35									
	O(CT)	75					ASN(K)	27			
							ELP	50,85,16,30			
							BIOC	27,72,44			
								43,27,18			

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LE GRAPHE D'APPRENTISSAGE

1.1 Les orientations majeures et mineures

Une orientation majeure est notée par des majuscules. Par exemple T(VL) dénote une orientation majeure dans le cas d'une médiation symbolique théorique de l'espèce visuo-linguistique. On attribue une orientation majeure à tout élément qui se classe dans l'intervalle percentile 50-99 d'une distribution de cet élément à un niveau donné de formation. Le sujet dont le graphe d'apprentissage, par exemple au douzième degré de la formation scolaire, comporte un T(VL) aurait obtenu une cote dans l'intervalle allant du 50e au 99e percentile de la distribution de cet élément, T(VL), parmi les sujets du douzième degré de formation scolaire.

Le symbole T'(AL) (lire T prime AL) apparaissant dans le graphe d'apprentissage d'un sujet, signifierait qu'il a obtenu pour cet élément une cote située dans l'intervalle percentile 26-49 inclusivement d'une distribution d'un niveau donné de formation scolaire.

Si le sujet a obtenu une cote située au 25e percentile ou à un percentile inférieur de la distribution d'un élément donné pour un niveau donné de formation scolaire, on dira qu'il a une orientation négligeable et le symbole correspondant sera absent de son graphe d'apprentissage.

1.2 Les symboles et leurs significations

Deux types de symboles, théoriques (les mots et les nombres) et qualitatifs (sensibles, programmatiques et sous forme de codes) sont créés et utilisés par les individus pour acquérir la connaissance et tirer du sens de leur milieu et de leurs expériences personnelles. Les symboles théoriques présentent au système nerveux, puis lui représentent, quelque chose de différent de ce qu'ils sont eux-mêmes. Par exemple, le mot parlé "tasse" est une sensation auditive qui représente à l'individu qui l'entend l'objet physique ainsi dénommé. Etant donné que cette sensation auditive (le son "tasse") présente au système nerveux de l'individu quelque chose qui diffère de ce, qu'il (le symbole) est

lui-même, on l'appelle "symbole théorique, audio-linguistique". Au plan visuel, l'imagerie suscitée chez l'individu par l'observation du mot imprimé "tasse", lequel présenterait à sa conscience le même objet physique que l'équivalent oral, est un exemple de médiation symbolique théorique de l'espèce visuo-lingusitique.

Les symboles qualitatifs présentent, puis représentent, au système nerveux de l'individu ce qu'ils sont eux-mêmes pour cet individu. Les significations propres aux symboles qualitatifs procèdent de trois sources:

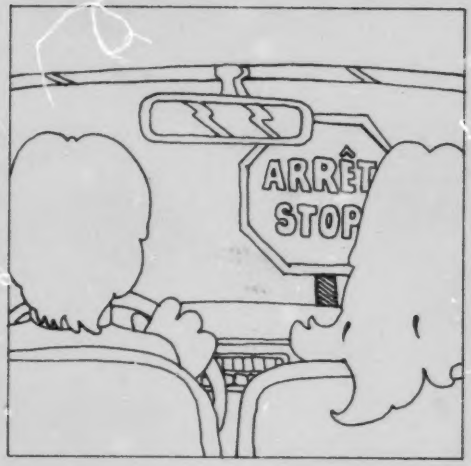
1. les stimuli sensoriels;
2. les codes culturels (jeux) et
3. les effets programmatiques d'objets donnant une impression quasi automatique d'une suite définie d'images, de scènes, d'événements et d'opérations.

L'ensemble des symboles comprend présentement vingt symboles qualitatifs dont cinq associés aux stimuli sensoriels, cinq de caractère programmatique et dix associés aux codes culturels.

LES SYMBOLES

Il y a deux types principaux de symboles théoriques - auditif et visuel - dont chacun se subdivise en éléments linguistiques et en éléments quantitatifs.

1.2.1 Les quatre symboles théoriques



T (VL) Théorique - visuo-linguistique:

habileté à déceler du sens dans les mots vus. Une majeure dans ce domaine dénote un sujet capable de lire avec un haut niveau de compréhension.

T (AL) Théorique - audio-linguistique:

habileté à saisir le sens des mots entendus.

T (VQ) Théorique - visuo-quantitatif:

habileté à acquérir du sens à partir de symboles, de relations et de mesures numériques.

T (AQ) Théorique - audio-quantitatif:

habileté à trouver du sens à partir de symboles, de relations et de mesures numériques exprimés oralement.

1.2.2 Les cinq symboles qualitatifs associés aux stimuli sensoriels

Q (V) Qualitatif - visuel:

habileté à percevoir du sens par la vue.

Q (O) Qualitatif - olfactif:

habileté à percevoir du sens par l'odorat.

Q (S) Qualitatif - gustatif:

habileté à percevoir du sens par le goût. Des chefs de cuisine devraient avoir des habiletés olfactive et gustative hautement développées.

Q (T) Qualitatif - tactile:

habileté à percevoir du sens par le toucher, la température de l'organisme et la douleur.

Q (A) Qualitatif - auditif:

habileté à percevoir du sens par l'ouïe. Une majeure dans ce domaine dénote l'habileté à distinguer des sons, les tons en musique et d'autres sensations purement soniques.

1.2.3 Les cinq symboles qualitatifs de caractère programmatique

Q (P) Qualitatif - proprioceptif:

habileté à synthétiser de nombreuses médiations symboliques en vue d'une réalisation exigeant la conduite d'une tâche complexe (taper à la machine, jouer d'un instrument de musique), ou encore en vue d'une prise de conscience immédiate d'un ensemble possible de rapports entre les médiations symboliques, c'est-à-dire pour le traitement des "signes".

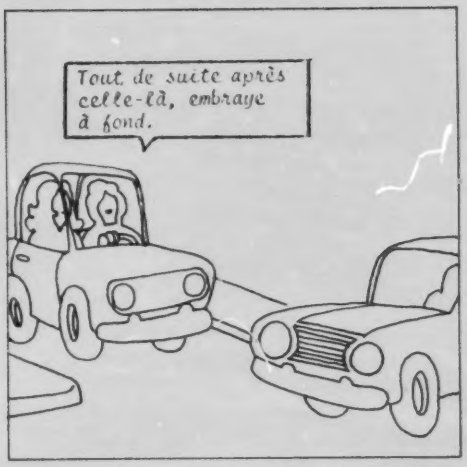
Bien que l'intelligence symbolique proprioceptive se laisse le plus aisément observer dans ce qui semble des réponses motrices automatiques telles que déchiffrer et jouer de la musique, certains types de médiations symboliques interviennent lorsque, en voyant de la fumée, on l'interprète immédiatement comme un signe évident de feu et qu'on éprouve les effets combinés de plusieurs sensations comprenant l'odeur de la fumée, le goût de la fumée et la sensation de la chaleur. Dans ce cas, une chaîne d'expériences antérieures et d'associations qui s'y joignent produit la médiation théorique du feu et des autres aspects qualitatifs.

Q (PK) Qualitatif - proprioceptif - cinématique:

habileté à synthétiser de nombreuses médiations symboliques en vue d'une réalisation exigeant la conduite d'une activité complexe qui comporte du mouvement.

Q (PD) Qualitatif - proprioceptif - dextral:

prépondérance de l'oeil, de la main et du pied droits (chez le droitier typique) dans la synthèse des nombreuses médiations symboliques en vue d'une réalisation exigeant la conduite d'une tâche complexe (jouer d'un instrument de musique, taper à la machine).



Q (PTM) Qualitatif - proprioceptif - temporel:

habileté à synthétiser de nombreuses médiations symboliques en vue d'une réalisation exigeant la conduite bien calculée d'une activité physique complexe.

Q (PS) Qualitatif - proprioceptif - sénestral:

prépondérance de l'oeil, de la main et du pied gauches (chez le gaucher typique) dans la synthèse des nombreuses médiations symboliques en vue d'une réalisation exigeant la conduite d'une tâche complexe (jouer d'un instrument de musique, taper à la machine).

1.2.4 Les dix symboles qualitatifs associés aux codes culturels

Q (CES) Qualitatif - code esthétique:

habileté à jouir de la beauté d'un objet ou d'une idée. La beauté de l'entourage ou une phrase bien tournée sont appréciées par une personne qui possède une disposition marquée dans ce domaine.

Q (CH) Qualitatif - code histrionique:

habileté à manifester un comportement délibéré ou à jouer un rôle pour produire quelque effet particulier sur d'autres personnes. Une telle personne sait répondre aux attentes dans les rôles qui lui sont dévolus.

Q (CET) Qualitatif - code éthique:

engagement face à un ensemble de valeurs, à un groupe de principes, d'obligations et/ou de devoirs. Pareil engagement ne remet pas nécessairement un caractère moral. Un prêtre et un criminel peuvent tous les deux être engagés face à un ensemble de valeurs, même s'il peut s'agir de valeurs nettement différentes.

Q (CT) Qualitatif - code transactionnel:

habileté à maintenir une interaction positive de communication qui influence d'une façon significative les buts des personnes engagées dans cette interaction (la vente).

Q (CEM) Qualitatif - code empathique:

sensibilité aux sentiments des autres; habileté à se mettre à la place d'une autre personne et à voir les choses selon son point de vue.

Q (CK) Qualitatif - code kinésique:

habileté à comprendre les fonctions non-linguistiques, telles que les expressions faciales et les mouvements du corps (les sourires et les gestes) et à communiquer par ces moyens.

Q (CP) Qualitatif - code proximique:

habileté à juger de la distance physique et sociale qu'une autre personne permettrait entre soi et elle-même.

Q (CKH) Qualitatif - code kinesthétique:

habileté à exécuter des mouvements d'adresse, ou à effectuer une coordination musculaire selon une performance recommandée ou acceptable (jouer aux quilles en bonne forme, ou au golf).

Q (CS) Qualitatif - code synnoétique:

connaissance personnelle de soi-même.

Q (CTM) Qualitatif - code temporel:

habileté à répondre ou à se comporter selon les attentes temporelles imposées à une activité par les participants de par l'ensemble des rôles associés à celle-ci.

1.3 Les déterminants culturels

Il y a trois déterminants culturels de la signification des symboles:

1. l'individualité (I);
2. les associés (A);
3. la famille (F).

C'est par la médiation de ces "déterminants" que l'individu soumet aux influences culturelles la signification des symboles. L'influence de "l'individualité" se traduit fréquemment par le besoin de l'individu d'énoncer des définitions, ou d'expliquer des situations dans ses propres termes. L'influence des "associés" apparaît fréquemment chez un individu qui comprend ce dont il s'agit, mais l'explique et en discute principalement en faisant appel aux formulations de ses associés éventuellement engagés dans la même situation que lui. Le déterminant de la "famille" est fréquemment démontré chez l'individu qui le possède par les exemples dont il peut se servir pour expliquer une situation ou pour résoudre un problème (ou les parents, ou les enfants, ou l'épouse, ou l'époux, ou les frères ou les cousins, etc., sont utilisés pour illustrer une situation analogue à celle dont il s'agit).

1.4 Les modes d'inférence

Le troisième ensemble du produit cartésien qui fixe le style d'apprentissage, comprend les éléments indiquant le mode d'inférence de l'individu, i.e. la forme d'inférence qu'il a tendance à utiliser.

M Magnitude: Ce mode correspond à une forme de "raisonnement catégorique" qui utilise des normes ou des classifications catégoriques comme base pour l'acceptation ou le rejet d'une hypothèse émise. Les personnes qui ont besoin de définir les choses pour les comprendre démontrent cette modalité.

D Différence: Ce mode suggère une tendance à raisonner par contrastes de un à un ou par comparaisons de caractéristiques ou de mesures choisies. Les artistes possèdent souvent cette modalité ainsi que les écrivains et les musiciens créateurs.

R Relation: Ce mode indique l'habileté à synthétiser beaucoup de dimensions ou d'incidents pour en dégager une signification unifiée ou, par l'analyse d'une situation, à découvrir ses parties constituantes. Les psychiatres utilisent fréquemment la modalité de relation dans le processus de psychanalyse d'un client.

L Appréciation: Ce mode d'inférence est employé par un individu qui recourt aux trois approches précédentes (M, D et R), en attribuant une valeur égale à chacune dans son processus discursif. Les individus qui se servent de cette modalité ont tendance à analyser, à questionner ou, précisément, à apprécier ce qui est en question dans le processus d'inférence d'une conclusion probable.

K Déduction: Ce mode indique le raisonnement déductif ou la forme de preuve logique utilisée en géométrie ou dans le raisonnement syllogistique.

1.5 Le complexe mémoire-intérêt

Le processus du complexe mémoire-intérêt est composé de deux ensembles d'information ayant rapport:

1. à la fonction mnémonique et
2. aux composantes de l'intérêt.

La fonction mnémonique est complexe, composée de quatre processus:

a) la reconnaissance, (RN);
b) la rétention, (RT);
c) le rappel, (RL);
d) l'association, (AN).

Les composantes de l'intérêt sont:

a) les personnes, (PN);

b) les processus, (PS);

c) les propriétés, (PT).

Le processus du complexe mémoire-intérêt est un aspect essentiel du style d'apprentissage d'un individu. Des travaux récents de biochimistes et de psychobiologistes fournissent des informations selon lesquelles la fonction mnémonique peut être exprimée au moyen d'éléments biochimiques choisis et de mesures électrophysiologiques des ondes alpha (α), beta (β), theta (θ), et delta (δ). On estime que les composantes de l'intérêt, personnes (PN), processus (PS) et propriétés (PT), contribuent aux éléments biochimiques produits par l'activité mnémonique et aux conditions traduites par les mesures électrophysiologiques, i.e. α, β, θ et δ. Par exemple, certains individus trouvent plus facile de se rappeler des personnes (PN), dépensant ainsi moins d'énergie (orientation majeure indiquant un état d'énergie potentielle, ou une mémoire "facile") dans cette activité de la mémoire que s'ils devaient, par exemple, se rappeler des processus (PS). Les situations dans lesquelles les individus éprouvent de la difficulté à exercer le processus de la mémoire sont indiquées par une orientation négligeable (i.e. l'élément ne figure pas dans le graphe) dans l'un ou l'autre ou dans une combinaison des processus de reconnaissance, de rétention, de rappel et d'association. L'orientation mineure sert à indiquer une condition de "dépense d'énergie neutre" dans l'un ou l'autre ou dans une combinaison des quatre processus de la mémoire, lorsque des échantillons de liquides du corps montrent un taux moyen de résidus d'éléments biochimiques jugés actifs dans le fonctionnement du complexe mémoire-intérêt.

Des travaux récents de biochimistes et de psychobiologistes distinguent entre la mémoire à court terme et la mémoire à long terme. La mémoire à court terme doit être présente, cependant, avant que la mémoire à long terme puisse apparaître. La mémoire à court terme peut devenir une mémoire à long terme grâce à la production de protéines et à la hausse des niveaux d'activité enzymatique dans les cellules du cerveau.

On pense actuellement que la mémoire à court terme est le résultat de processus de courtes durées.

Des expériences récentes sur des animaux ont montré que l'injection de stimulants dans le système nerveux central peut affecter à la fois la mémoire à court terme et la mémoire à long terme. On a également observé chez des sujets humains des effets différents sur la mémoire résultant d'injections chimiques. Les implications pédagogiques à venir pourraient bien consister dans l'usage de stimulants de la mémoire immédiate et d'autres agents chimiques pour accroître la durée de l'attention et pour décroître les éléments protéiques inhibant la fonction du complexe de la mémoire-intérêt.

1.6 Le profil d'apprentissage

La science pédagogique du style d'apprentissage combine l'information comprise dans les quatre premières "sciences" au moyen d'un produit cartésien de ces quatre ensembles de façon à fournir une image des profils distribués sur les quatre ensembles qu'un individu met en jeu dans la quête du sens. Ces profils reflètent les "points forts" du style d'apprentissage d'un individu et permettent de déterminer des prescriptions pédagogiques lui facilitant le processus d'apprentissage.

Actuellement les individus font l'objet de tests et d'inventaires relatifs aux éléments compris dans les trois premiers ensembles seulement, i.e. les symboles et leurs significations, les déterminants culturels et les modalités d'inférence. Les instruments servant à recueillir de l'information sur l'ensemble mémoire-intérêt sont actuellement en préparation.

2.0 LE STYLE D'ENSEIGNEMENT, DE CONSEIL ET D'ADMINISTRATION

Chacun de ces trois styles est représenté par un produit cartésien de trois ensembles d'information relative 1) à l'attitude, 2) à l'insistance et 3) aux modes symboliques de présentation ou de

communication. La différenciation entre le style d'enseignement, le style de conseil et le style d'administration d'un individu selon ces dimensions ("préoccupation" et "mode") tient au changement d'orientation (majeure et mineure) susceptible de se présenter à l'intérieur de chaque style. Par exemple, un individu peut afficher une orientation majeure quant aux processus (PS) dans son style d'enseignement et une orientation majeure quant aux personnes (PN) dans son style d'administration.

2.1 Le style d'enseignement

L'ensemble "attitude" du style d'enseignement inclut trois éléments:

1. prédominant (Pap);
2. adapteur (Sap);
3. flexible (Bap).

Ces trois caractérisations d'attitude peuvent se présenter en combinant ou bien une orientation majeure avec deux orientations mineures, ou bien deux orientations majeures avec une orientation mineure. Chacun de ces éléments est affecté de l'indice autoritaire (a) ou permissif (p). Un type autoritaire est un individu qui respecte les désirs et les décisions des personnes occupant une position supérieure à la sienne et qui s'attend à ce que ses désirs et ses décisions soient respectés quand il assume le rôle de supérieur. Un individu permissif est celui qui ne pratique pas ce "respect" et ne s'attend pas à ce que les autres le pratiquent eu égard à sa fonction. Les orientations de l'ensemble "attitude" se combinent avec celles des ensembles "préoccupation" et "mode symbolique" (QP) - Qualitatif Prédominant; RP - Réciprocité; TP - Théorique Prédominant) pour former des profils indiquant le style d'enseignement d'un individu.

2.2. Le style de conseil

Le style d'apprentissage des individus engagés dans des situations de conseil, comme dans le cas du style d'enseignement et d'administration, est important, mais il ne rend pas compte à lui seul

du comportement des conseillers. Les éléments touchant l'attitude dans le style de conseil et exprimés sous forme d'orientations majeures et mineures comprennent:

a) l'attitude directive (V,v);
b) l'attitude situationnelle (U,u);
c) l'attitude non-directive (O,o).

On les établit à partir de l'attitude du conseiller sur la question de savoir qui devrait fixer les objectifs et en déterminer les voies d'approche dans la situation de conseil. Aux conseillers qui procèdent selon la formule "mes objectifs à ma manière" sans égard à la situation de conseil, on donne une orientation majeure pour l'élément "directif" dans l'ensemble "attitude". Aux conseillers qui sont à certains moments directifs et à d'autres moments non-directifs selon la situation, on accorde une orientation majeure pour l'élément "situationnel". Aux conseillers qui ont tendance à ne pas diriger le comportement peu importe la situation de conseil, on accorde une orientation majeure pour l'élément non-directif. Le style de conseil global d'un individu s'exprime sous forme de profils montrant des orientations majeures et mineures distribuées sur les trois ensembles de l'attitude, de la préoccupation et du mode symbolique.

2.3 Le style d'administration

Les orientations majeures ou mineures des quatre éléments de l'attitude, dominante (N, n), accommodante (J, j) et coopérante (C, c) gardienne passive (X, x), les orientations majeures et mineures des "éléments de la préoccupation": personnes (PN), processus (PS) et propriétés (PT), ainsi que les orientations majeures et mineures des éléments du mode symbolique: qualitatif prédominant (QP), réciproque (REC) et théorique prédominant (TP) constituent les profils qui définissent le style d'administration d'un individu. L'administrateur dominant (N) opère selon la formule "mes objectifs à ma manière", le type accomodant (J) opère selon la formule "mes objectifs à votre manière ou vos objectifs à ma manière"; l'administrateur coopérant (C)

manifeste une attitude justificiable de la formule "nos objectifs à notre manière"; tandis que l'attitude gardienne passive d'un administrateur correspond à la formule "vos objectifs à votre manière".

3.0 L'ANALYSE SYSTEMIQUE ET LA PRISE DE DECISION

Un système est une collection définie d'éléments interreliés et étalés sur une période de temps. Tout aspect de l'éducation peut être conçu comme un système.

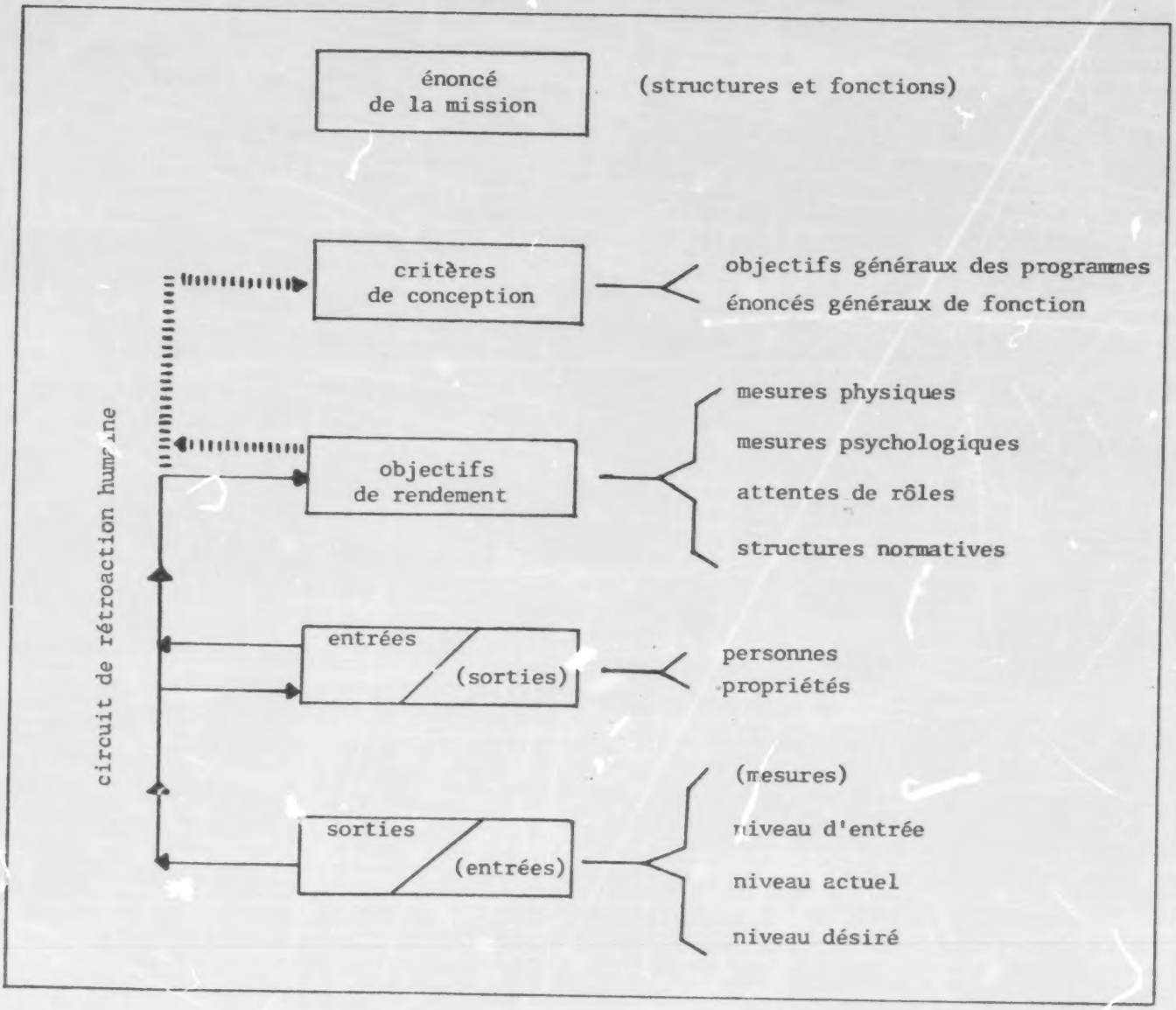
Le but primordial de l'analyse systémique est la prise de décision aboutissant à un choix parmi des options à la disposition de celui qui prend la décision. L'analyse d'un système est conduite de manière à déterminer dans quelle mesure les objectifs d'un système sont atteints à l'intérieur des contraintes imposées par les entrées du système, à quoi s'ajoutent les considérations de sa mission et des principales fonctions (critères de conception) à partir desquelles on a conçu le système.

L'énoncé des objectifs de rendement doit préciser les tâches à accomplir, les conditions qui s'y attachent, et le rendement minimum requis pour les mener à bonne fin. Tout système peut être défini et analysé au moyen du modèle d'analyse systémique.

Par exemple, un programme éducatif peut se définir comme un système social de trois éléments génériques: les personnes, les processus et les propriétés[3], interreliés et étalés sur une période de temps. Ce système peut être défini en rédigeant un énoncé de la mission, en établissant ses critères de conception, en structurant des objectifs de rendement pour chaque critère et en déterminant les entrées (personnes et propriétés) nécessaires pour réaliser les tâches définies par les objectifs de rendement du système.

Les sorties d'un système sont des mesures du rendement des personnes, des processus et des propriétés à l'intérieur du système en tant que fonctions de support (les variables de support), et en tant que mesures et produits résultant du rendement de ces trois

MODELE D'ANALYSE SYSTEMIQUE



éléments dans l'accomplissement de la mission du système (les variables d'impact).

Durant la période d'opération du système, l'information est placée dans les éléments du circuit de rétroaction humaine par des réunions et des conversations en vue de décisions concernant des modifications éventuelles d'éléments et/ou de leurs interconnexions pour maintenir l'ajustement du système à son environnement intérieur et extérieur. L'objectif dernier de l'analyse systémique est de dégager les décisions optimales, c'est-à-dire les décisions les meilleures pour tous les éléments qui concourent à la prise de décision. Il est à remarquer que les meilleures décisions ne sont pas toujours "parfaites" pour chacun des éléments affectés par le système.

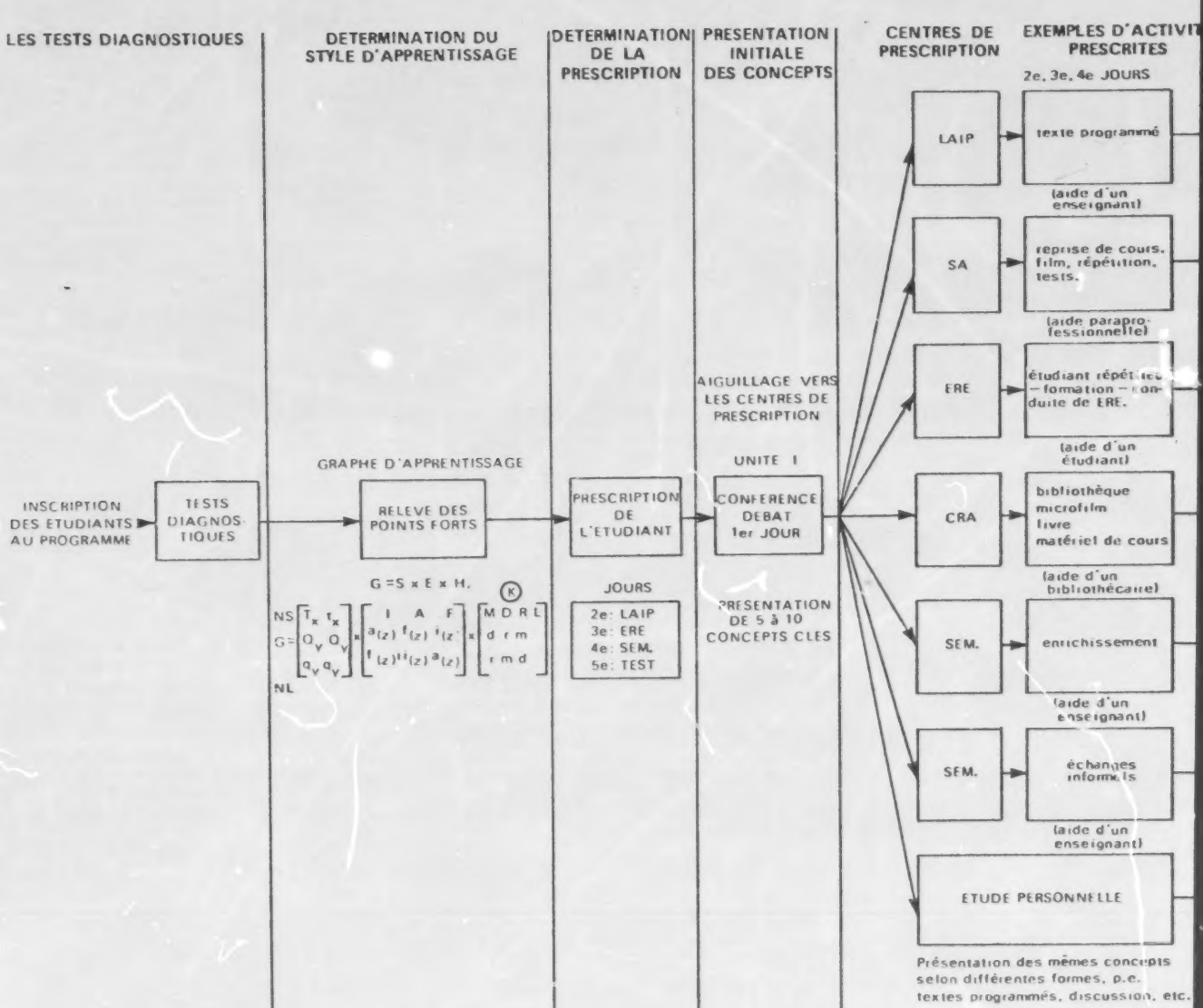
4.0 L'EDUCATION PERSONNALISEE

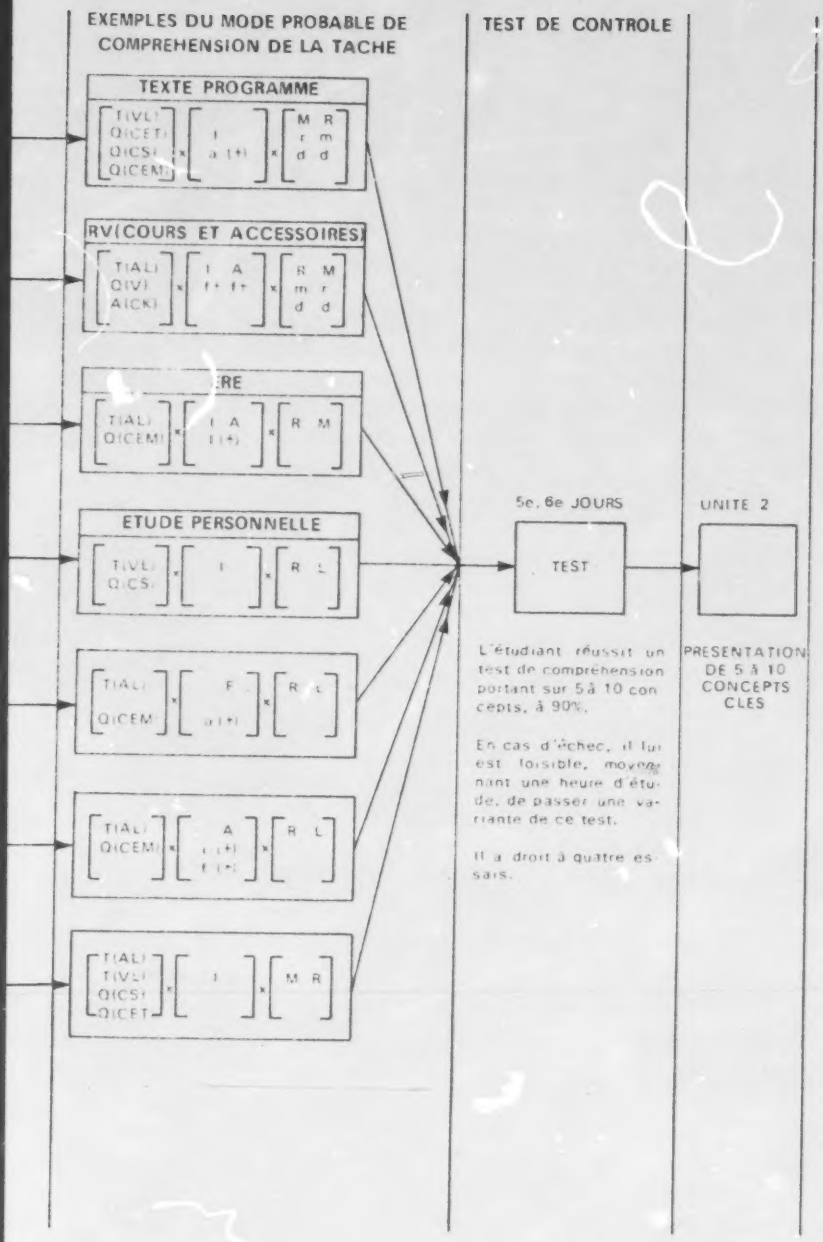
Le graphe d'apprentissage d'un étudiant présente une image des divers profils qu'il utilise dans son éducation, i.e. qu'il utilise dans sa recherche du sens. La détermination du graphe d'apprentissage d'un individu permet à l'éducateur de prendre en considération des aspects de l'individu qu'il aurait pu ignorer sans l'aide du graphe. Le diagnostic du style d'apprentissage d'un individu et les modes de compréhension requis pour une tâche scolaire peuvent être utilisés pour ajuster l'étudiant à la tâche. Une telle approche permet de prescrire des activités scolaires qui offrent une meilleure chance de réussite qu'il n'eut été possible autrement.

A P P E N D I C E :

TABLEAU MONTRANT LE DEROULEMENT DU PROGRAMME D'ETUDES PERSONNALISE (PEP) DEPUIS LES TESTS DIAGNOSTIQUES JUSQU'A LA REUSSITE D'UNE UNITE D'INSTRUCTION.

PROGRAMME D'ETUDES PERSONNALISE





L'étudiant réussit un test de compréhension portant sur 5 à 10 concepts, à 90%.

En cas d'échec, il lui est loisible, moyennant une heure d'étude, de passer une variante de ce test.

Il a droit à quatre essais.

AAOIP/PEP

L'administration, assistée par l'ordinateur, de l'instruction personnalisée.

Le mode de compréhension de la tâche éducative est utilisé par l'ordinateur pour déterminer les modes de présentation relevant des centres de prescription. L'ordinateur est alors utilisé pour mettre en rapport le style d'apprentissage de l'étudiant et le mode de présentation jugé le meilleur pour lui. Après quoi, l'AAOIP administre un test d'entrée, le note et en transmet les résultats à l'enseignant. L'AAOIP administre aussi les tests terminaux sur les unités, les note et en transmet les résultats aux enseignants, aux centres de prescriptions et aux étudiants. De plus, l'AAOIP est en mesure d'analyser ces résultats au point de préciser les concepts d'une unité d'étude que

a) l'étudiant a maîtrisés

b) l'étudiant n'a pas maîtrisés

c) dans ce dernier cas, il pourrait le plus aisément s'approprier ou

d) aurait vraisemblablement le plus de difficulté à s'approprier.

SIGNIFICATION DES SIGLES UTILISES DANS LE TABLEAU

AAOIP	administration, assistée par l'ordinateur, de l'instruction personnalisée.
CRA	centre des ressources d'apprentissage.
ERE	étudiants - répétiteur - étudiant
LAIP	laboratoire d'apprentissage individualisé programmé.
PEP	programme d'étude personnalisé
RV	reprise vidéo de cours.
SA	station d'apprentissage : ensemble d'aires de travail, équipées d'appareils, pour le travail individuel et pour le travail en petit groupe.
SEM	séminaire.

ANNOTATIONS

[1]Le terme "sens" est synonyme de "signification"

[2]Le terme "graphe" est emprunté à la théorie des ensembles. L'Encyclopédie Bordas le définit comme suit: "Une relation R permet de définir une partie de l'ensemble E x F, ensemble des éléments (x, y) tel que R x, y soit vraie. Cette partie (ce sous-ensemble) est appelé le graphe de la relation R. "Voir le tome XI, les Nombres et l'espace (Paris, Bordas, 1972), p. 34."

[3]Le terme "propriétés" signifie les biens meubles et immeubles.

ARRIVING AT INDIVIDUALIZATION & PERSONALIZATION
A SET OF ELEMENTS

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The author describes a set of elements that he considers essential for any program claiming to be individualized and personalized. These elements are based on his experiences in the implementation and management of innovative individualized and personalized education programs in the Continuing Education Division, Canadore College, North Bay.

INTRODUCTION TO THE PROCESS OF INDIVIDUALIZATION AND PERSONALIZATION

A variety of rapid changes has recently taken place in education. Many of these changes focus on the way we meet the needs of each student and respond to individual differences, or what is commonly labelled "individualization and personalization." (I & P).

Most educators do not find such changes unpalatable, but developing procedures, techniques, and policies to make these changes is a much more demanding task than most envisage.

What is "I & P" and how does it differ from the traditional approach to education and specifically instruction? An I & P program is one that places the learner at the centre of all the activity. In a recent speech, Lister Sinclair, Vice-President of the Canadian Broadcasting Company, said:

> A tide youth is rising, a generation waiting, counting on us. They arrived at a decisive moment in human history. They must learn more, learn better and learn faster than ever before. They are faced with a sea of information that modern life demands. They must master it or drown. Much of what they are now being taught is obsolete and much of what they will need to know has not yet been discovered. They must continue to learn until the end of their days.
>
> In a scientific and technological age, education is the key to strength. A nation which does not value trained intelligence is doomed. The "beep beep" of a Russian satellite in 1957 sounded the alarm challenging American self-assurance, questioning the teaching of science and techniques. Sputnik, that ominous visual aid, appeared like a new star in the sky of educational tradition. The whole science of schooling was put in doubt. What is teaching? What is learning? Appeals were made to psychology, to cybernetics, the great foundations poured money into experiments which are still being discussed. All the results are not in, but the copernican revolution in education begun in the 17th century is underway to put the learner, rather than the teacher at the centre of the educational process.

Today many colleges are attempting to place a new emphasis on the learner by implementing an I & P approach to instruction.

INDIVIDUALIZATION & PERSONALIZATION AS A PROCESS CONSISTING OF MANY ELEMENTS

Is a program individualized and personalized if we have large, open areas full of sophisticated hardware? or if we declare it an "open program" with classrooms? Let me state categorically that these programs are not based simply upon open rooms and the sophistication and quantity of the hardware. These are but two elements in the I & P process of education programs. Too many educational administrators today have an architectural concept of I & P which often results either in the failure of or dissatisfaction with the rest of the process. Successful I & P education programs are based on the eclectic selection and integrated implementation of a great many elements in the I & P process. If an element is missing, problems will be encountered and we will be tempted to "throw the baby out with the bathwater."

MAIN ELEMENTS OF THE INDIVIDUALIZATION AND PERSONALIZATION PROCESS

Most fully individualized and personalized education programs contain a large proportion of the following elements which comprise an instructional systems technology.[1]

A. Philosophical & Taxonomic Considerations

(a) An orientation to I & P that blends educational technology and educational humanism.

(b) A confluent (behavioristic/humanistic) orientation to the cognitive and affective domains.

(c) Objectives that adhere to a confluent learning approach; i.e. the affective or emotional should not be ignored at the expense of the cognitive or content objectives.

(d) Objectives to be written with attention to the various taxonomies and taxonomic levels.

B. Instructors

(a) Instructors in I & P programs are used as resource persons and learning managers. They organize the elements (of the set) to help the student achieve the agreed upon objectives of his or her educational program. Presenting information is no longer a major function.

(b) Instructors in I & P programs have more time to spend with each student, and are able to work with more students than is the case in traditional programs.

(c) I & P includes a large number of elements and tools. An effective instructor creates an individualized process that is intellectually honest by selecting the proper mix for each individual student.

(d) Paraprofessionals are used in I & P programs to assist the instructors and students. They can perform a variety of tasks that can be specified and arranged in a hierarchy demonstrating different performance levels.

C. Students

(a) I & P programs allow for student inputs in design and evaluation.

(b) Peer tutoring is a program element; peer tutors should be paid for their service.

(c) Personal and academic counselling is available to all students with regard to their individual needs. Counsellors must have faculty involvement with regard to learning problems. The counselling office along with administrators and teachers use cognitive style mapping as one tool in the counselling and learning process.

A cognitive style map is a picture of the way a student derives meaning from his environment and personal experience. It identifies the modes (e.g. listening and reading) in which a student masters an educational task more readily, thereby contributing to efficient management of instructional resources. Further information is available on cognitive style mapping under "note[6]".

D. Instruction

(a) Individual diagnosis of learning problems.

(b) Pre-tests and post-tests.

(c) Prescriptions for each student after pre-testing and diagnosis of need.

(d) Criterion-referenced measurement systems.[2]

(e) Content sequenced from the lowest to highest across levels.

(f) Social and material reinforcement for learning.

(g) Behavioral objectives.

(h) The use of the generic objective.[3] This is a content free standardized form of a behavioral objective.

(i) Computerized data banking of objectives, test items and resources. Data banking necessitates a content classification system.

(j) Mediate[4] instruction by design rather than by chance. This is achieved through the Educational Sciences[5] and specifically cognitive style mapping.[6]

E. Financial

(a) Financial priorities are determined to achieve the innovative educational objectives of the school.

F. Counselling, Training & Orientation

(a) Behavio therapy (test desensitization, etc).

(b) Counsellors in a partnership with students, faculty, paraprofessionals and administrators. The goal is learning and the solution of learning problems.

(c) In-service training for administrators, counsellors, faculty, and paraprofessionals.

(d) Individualized student orientation to the new methods and processes.

(e) An extensive individualized professional development program, supervised by an educational development officer, available to all campus personnel.

G. Physical Facilities

(a) An open architecture or the innovative use of traditional space.

(b) Priorities established to acquire the necessary hardware or equipment usually required in I & P programs. This hardware must be available in sufficient quantities for the new methodologies.

(c) An extensive variety of software either purchased, developed or adapted to meet the instructional objectives.

H. Management Information, Evaluation Systems, Accountability and Planning

(a) A computer-managed information system to be established to complete as much routine work as possible. Computer managed instruction (CMI) implies a sophisticated, flexible computerized management information system. This can be distinguished from computer assisted instruction (CAI) which is one instructional delivery mode. The objective of CMI is to have a total management information system delivering accurate information at the appropriate time to the educational users who must make critical decisions, i.e. administrators, faculty, paraprofessionals, counsellors and students.

(b) A computerized sophisticated evaluation system to be adopted or developed. The system should have the following major capabilities:

i economize testing through the use of sampling techniques;

ii provide information on student achievement by objectives, student achievement by manager, total group achievement, achievement by time and content area;

iii provide pre-test and post-test data;

iv provide curriculum analysis and validation assisted by the computer;

v measure retention over time;

vi use curriculum embeded tests to monitor achievement;

vii allow for greater student management of learning;

viii furnish formative as well as summative evaluation data for curriculum revision;

ix be computer managed for maximum efficiency in evaluating large numbers of students.[7]

(c) Accountability models should be used and all members of the educational organization should be held accountable for student learning outcomes. Administrators should not hold persons responsible for outcomes over which they have no control. The use of accountability models assumes that all the elements of I & P necessary to achievement have been provided.

(d) A planning method must be used to solve complex problems resulting from the interrelationship of I & P elements. Anasynthesis, the process of analysis, synthesis, modeling and simulation, is a form of systems analysis and an excellent method for educators.[8]

DISCUSSION

Elements - Use, Misuse & Results

I have listed the main elements to demonstrate that a fully I & P educational program is not just an open classroom or a sheet of rote-memory-level behavioral objectives. Most of the criticism I hear about the systems approach to instruction or I & P programs is levelled at the misuse of that system. Before we can criticize I & P, we must be sure that we are criticizing a process that includes most, if not all, of the elements necessary to its success in a given learning environment. In short, we must be sure we are criticizing a process that has <u>enough elements</u> to be termed I & P. An education program cannot be fully I & P in a week or two by a "declaration of individualization."

Instructional systems technology is a new field and innovations are being made constantly. The development of the set of elements listed in this paper is a dynamic rather than a static process. Using these elements, instructors and students achieve substantially better results and now have the means to measure much of what actually takes place. Before programs are individualized and personalized through the use of an instructional systems approach, results usually cannot be measured.

Instructors in an I & P program have more time with each student, and, in most cases, are able to work with many more students than in traditional programs.

Humanizing or Dehumanizing

Despite some criticism, I & P programs are not dehumanizing. However, if there is only a pretence of I & P, if only a few elements are used, learning can be dehumanized. After the students, instructors are the most important aspect in an I & P program. In such programs they are released from many of the "non-human" tasks, and can better use their professional judgement in their new role as managers of learning, and concentrate on the humanizing aspects of education.

The Instructor as Manager of Instruction

The instructor is a manager who arranges the elements of the set in an organized manner to help the student achieve the agreed upon objectives of the student's education program. Success means that there is a match between the objectives of the student's program and the student's learning outcomes.

The elements of I & P place the instructor in the role of designer and manager of learning rather than as the provider and dispenser of information. Much of this last function is fulfilled by the computer, a full range of mediation, and the paraprofessionals. The instructor is the professional resource person, the diagnostician, the prescriber of instructional material, the interpreter of evaluation data; in short, the humanizer of the educational process.

When many persons first individualize and personalize, they spend more time diagnosing and testing than actually helping students learn. Sampling technique should be used to reduce testing in I & P programs. Sometimes educators are tempted to interfere too much in the learning process when interference is not necessary. There is often a reluctance to permit students to manage even a portion of their own learning. Curriculum-embedded tests are

viewed with suspicion because their role is not understood. Sampling techniques are neglected in education—those very techniques business schools promote so that industry does not place the product's cost beyond the consumer's reach.

It is my opinion that we have a tendency to produce reams of mediation without considering that we often mediate by chance. Granted, behavioral objectives and criterion-referenced measurement can help students to learn by design rather than by change, but we forget that we are mediating by chance.

A common misconception of I & P states that educational technology in such programs replaces the instructor. This is definitely not the case. Instructors may find themselves in a new role as managers of learning rather than as presenters of information. The Educational Sciences emphasize that some students learn best by lectures, consequently lectures and competent lecturers are an important component in an I & P learning program.

Selecting the Proper Mix of Elements for each Student

I & P is composed of a large number of elements and tools. The effective instructor is a manager who can select the proper mix for each individual student. An individualized process that is intellectually honest is simply one in which the managers use all of the available tools and select the proper mix for each student.

When I taught International Marketing at university, I was very involved with a concept called "The Marketing Mix". This concept required the student to consider all the elements of marketing and select the proper mix of elements to solve a specific marketing problem. I submit that there is a set of elements in I & P and it is from that set that we must select the proper mix for each student.

Having outlined the problems of creating a fully individualized and personalized process, I don't want to discourage you. You can begin... gradually! I may mention that no one has the "perfect" package. Most attempts at I & P are eclectic and involve simply plain hard work. First, you can begin by writing objectives and progress to higher and higher levels of sophistication (don't forget that today a great deal of material

can be obtained commercially). This should save you a great deal of time and money in the long run.

CONCLUSION

In closing, it is my sincere hope, that my experiences will stimulate you to implement an I & P educational program. I hope you will participate actively in attempting to solve the many problems that still exist in the implementation and management of I & P programs.

N.B.: See page 86 for "NOTES".

NOTES

1. INSTRUCTIONAL SYSTEMS TECHNOLOGY

This is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, employing a combination of human and non-human resources to bring about more effective instruction.[1]

2. MEASUREMENT

There are two approaches to measurement in education programs:

- Norm-referenced measurement is used to identify an individual's performance in relation to the performance of others on the same measure.
  Norm-referenced measures are devised to facilitate comparisons among individuals.
- Criterion-referenced measurement is used to identify an individual's status with respect to an established standard of performance. The individual is compared with some established criterion rather than other individuals.[2]

Criterion-Referenced Reliability: For norm-referenced measures the classical concepts of reliability apply, but for criterion referenced measures they are inappropriate. If, after instruction, everyone scores perfectly on a test that reflects accurately the instructional objectives, the test need not be faulted if it produces no variability, hence a zero reliability co-efficient.[3]

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[1] Hitchens, Howard B. Jr. "Six Charateristics in Search of a Profession, An Intellectual Technique," Audiovisual Instruction, 101 - 102, November 1971

[2] Popham, James W. (editor). "Criterion-Referenced Measurement," Educational Technology Publication, 1971

[3] "Modern Measurement Methods," Booklet No. 22, p.11, Englewood Cliffs, N.J: Prentice Hall, 1973

Content Validity: Criterion-referenced measures are validated primarily in cerms of the adequacy with which they represent the criterion. A carefully made judgement, based on the test's apparent relevance to the behaviors delimited by the criterion is the best procedure for validating criterion-referenced measures. This judgement-based operation is referred to as content validity. The more precisely instructional objectives can be explicated, the more accurately judgements can be reached regarding a test's content validity.[1]

Domain Referenced Achievement Testing: Measurement specialists such as Wells Hively have devised techniques to increase the precision with which content validity can be determined.
For each measurably scaled instructional objective an "item form" is written delimiting the form of the test items which may legitimately be used to assess whether the objective has been achieved. In this sense, the domain of eligible test items has been defined and therefore this approach is called "Domain Referenced Achievement Testing."[2]

Item Sampling: Both norm-referenced and criterion-referenced measures that are used to make decisions regarding individuals require the same test, or an equivalent form, be used with each individual. However, criterion-referenced tests used for evaluating instructional programs need not be the same for everyone. The concept of item sampling (sometimes referred to as matrix sampling) in which different people complete different items, thereby permitting the sampling of more behavior with shorter tests, is highly appropriate for evaluating instructional sequences.[3]

Formative Evaluation: is an instructional sequence evaluated to improve the sequence itself.
Summative Evaluation: is the worth of a completed instructional sequence appraised (in comparison with competing sequences).[4]

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[1] "Modern Measurement Methods," Booklet No. 22, p. 13, Englewood Cliffs, N.J: Prentice Hall, 1973.

[2] Ibid., p. 14.

[3] Ibid., p. 16.

[4] "Current Conceptions of Educational Evaluation," Booklet No. 20, p.8 Englewood Cliffs, N.J: Prentice Hall, 1973.

3. GENERIC OBJECTIVE

The "generic objective" (GO) is a standardized format for a behaviourally-oriented objective that is both specific and general. It is specific in that it describes the type of stimulus to be given, states how the stimulus will be presented and limits the student response to a particular behavior. It is general in that it does not cite the specific stimulus material or content to be used.

If the objective in any course (including skill) can be expressed behaviorally, it can be formulated as a generic objective.[1,2].

4. MEDIATE

To mediate is to make available a variety of instructional delivery modes or communication vehicles for each instructional objective.

A fully mediated program would be based upon:

1. The use of hardware such as audio recorders and playback units, computers, video-cassette recording and playback units, overhead transparency and filmstrip production equipment.

2. The use of print and non-print software such as audio cassettes containing course material, computer programs and CAI programs, video-cassettes containing course material, transparencies and filmstrips containing course material and textbooks.

3. The availability and use of a variety of presentation formats for each objective such as lecture, seminar, lecture-discussion, independent study, tutorial and programmed instruction.

Mediation: Mediation is a complex subject and mediation of instruction by design can be understood best by a study of the Educational Sciences and cognitive style mapping. Mediation of instruction by design means choosing the optimum mix of communication vehicles so each student receives

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[1] O'Reilly, Robert G et al. Comprehensive Achievement Monitoring. Amhurst Mass: University of Massachusetts, School of Education, 1975

[2] The method of applying the generic objectives is available from Paul Dudgeon, Canadore College, North Bay, Ontario.

instruction according to his/her individual cognitive style.[1]

5. THE EDUCATIONAL SCIENCES

The seven educational sciences as defined by Dr. Joseph Hill are:

1. symbols and their meanings;
2. cultural determinants of the meanings of symbols;
3. modalities of inference;
4. biochemical and electrophysiological aspects of memory;
5. cognitive styles of individuals;
6. teaching styles, administrative styles, and counselling styles;
7. systematic analysis and decision making.

In the educational programs a knowledge of the Educational Sciences is essential if we wish to individualize and personalize. The Educational Sciences stress that a knowledge of administrator, faculty, counsellor and student styles ensures that mediation will occur by design. This approach enables educators to take a success-oriented approach to avoid failing students and wasting their time due to lack of sophisticated style information that can be provided through an analysis of cognitive style. The vehicle for cognitive style analysis is a computer produced cognitive style map derived from test results.[2]

6. COGNITIVE STYLE MAPPING

A cognitive style map is a picture of the way a student derives meaning from his environment and personal experience. Each map, like each student, is unique and different. A student's cognitive style is determined by the way he takes notice of his total surroundings: how he seeks meaning, how he becomes informed. Is he a listener or a reader? Is he concerned only with his point of view or is he influenced in decision-making by his family or group associates? Does he reason more like a mathematician or a social scientist?

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[1] Dudgeon, Paul J. Continuing Education Division, Canadore College, North Bay, Ontario.

[2] Ibid.

A cognitive style map identifies the modes in which a student can master an educational task most readily, thereby contributing to the effective management of instructional resources.

A cognitive style map provides the individual with the self-knowledge essential to pursuing realistic career goals. Since cognitive style is not immutable, it can be augmented. Missing strengths required for a specific occupation can be built up on a student's existing strengths. Using the individual's cognitive style map and subjective information gathered in private conversation, a team of instructors with the student develop a personalized education program geared to the student's strengths and weaknesses—a program that is a personal educational prescription and will promote success. A computer may be used to expedite the process.[1]

7. CANADORE COMPREHENSIVE ACHIEVEMENT MONITORING (CAM)

The Canadore Continuing Education Division Comprehensive Achievement Monitoring (CAM) mathematics system fulfills all of the above requirements for both CMI and a computerized evaluation system.[2]

CAM provides an innovative, effective means of evaluating student performances for a particular course of study whether it is conventional or experimental in nature.

The Canadore Math CAM provides:

1. a complete achievement profile for each student on a continuous basis;
2. information on any student's performance by objectives, by manager, and many concomitant variables, as well as total group achievement by time and content area;
3. the detection of learning, non-learning, forgetting and retention;

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[1]Further information about the Educational Sciences and their use in education can be obtained from:

(a) Dr. Joseph Hill,
President,
Oakland Community College,
Bloomfield, Michigan, and

b) information about the use of the sciences by Canadore's Continuing Education Division is available from Paul Dudgeon.

[2]Several papers on the Canadore CAM are available from Paul Dudgeon.

4. diminished testing jitters. Students find the CAM approach to evaluation refreshing—boredom and apathy are effectively countered;
5. a course structure which is not fixed or rigid. The structure is open to manager preference;
6. continuous intake and exit. It is now possible to have any student start and stop at any point in the curriculum;
7. continuous feedback to administrators, managers and students;
8. formative and summative evaluation in a systematic fashion;
9. cost reduction. Costs associated with the retrieval of evaluation data have been reduced substantially through CAM's sampling technique;
10. an important tool for instructional decision-making. Decisions relating to re-teaching, omitting, condensing, adding to, digressing from, altering and re-forming instructional groups tasks and sequences can now be made on a sound basis.
11. computer-assisted curriculum analysis and validation.[1]

8. ANASYNTHESIS

A system is defined as the structure or organization of an orderly whole, clearly showing interrelations of the parts to each other and to the whole itself.

The process of analysis, synthesis, modeling and simulation is called anasynthesis.

- Analysis is performed on existing information to identify the problem, existing elements (e), and their interrelationships (i).
- Synthesis is performed to combine unrelated elements into a new whole.

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[1]Dudgeon, Paul J. "Learner at the Centre. A Project in the Management of Instruction." Continuing Education Division, Canadore College, North Bay, Ontario.

- Models that can predict effectiveness before actual implementation of the system are constructed.
- Simulation is performed using these models to produce alternative solutions.
- A model is a conceptualization in the form of a mathematical (or other) equation, a physical device, a narrative consisting of words and/or symbols, or a graphic analog such as a flow chart.
- Models are constructed to represent real-life situations. The faithfulness of this representation is known as fidelity.
- The modeling to which anasynthesis refers is customarily flow chart and mathematical models.
- Whenever possible, mathematical models are preferred.

Anasynthesis has discrete steps and is a definitive process. It can be applied to all aspects of education and is not necessarily limited to analyzing, synthesizing, modeling and simulating in the curriculum development domain. In this sense, it is characteristic of general systems theory which deals with a set of rules common to all systems. Anasynthesis is utilized to obtain solutions in complex systems. When is a system complex? Complexity is simply a function of the number of elements (e) and the number of interrelationships (i):

$$C = f(e,i)$$

In a flow chart model consisting of rectangles containing descriptors and signal paths or arrows containing information, as in figure 1, the rectangles are elements (e), and the signal paths represent interrelationships (i). Thus, a large system with many e and i will be more complex than a small system having only a few e and i.[1,2]

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[1]Silvern, Leonard C. Education and Training Consultant, California.

[2]See also An Institutional Systems Technology Model for Institutional Change by Paul Dudgeon (ERIC ED 099 095) For a detailed overview of Canadore College's use of anasynthesis.

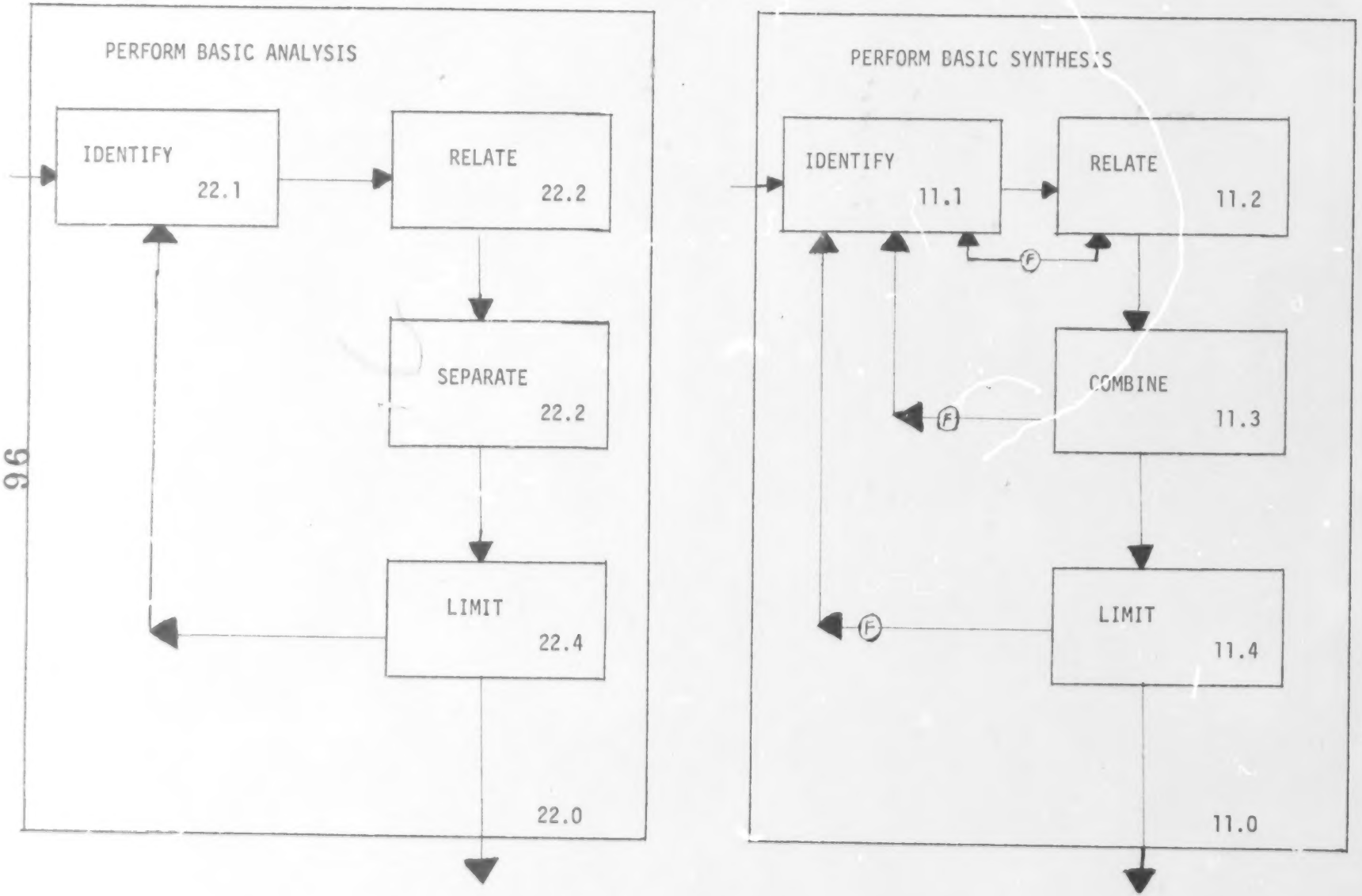

FIGURE 1 FLOW CHART MODEL

LES PROGRAMMES D'ETUDES PERSONNALISES

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LES PROGRAMMES D'ETUDES PERSONNALISES

1.0 LES SCIENCES PEDAGOGIQUES COMME CADRE DE REFERENCE

2.0 LA PROGRAMMATION PERSONNALISEE DES ETUDES

- 2.1 Administration des tests pédagogiques
- 2.2 La détermination du profil d'apprentissage
- 2.3 L'aiguillage vers les centres de prescription
- 2.4 Le laboratoire d'apprentissage individualisé et programmé
- 2.5 Les stations d'apprentissage
- 2.6 Les étudiants répétiteurs
- 2.7 Les séminaires
- 2.8 Étude personnelle - le centre des ressources d'apprentissage

3.0 LES RESULTATS

APPENDICE:

Guide succinct pour la détermination du style d'apprentissage.

Le présent document décrit le programme qui utilise une approche pédagogique individualisée à l'Oakland Community College (OCC).

L'idée du programme est de mettre au point pour chaque étudiant une prescription pédagogique basée sur les points forts indiqués dans son profil d'apprentissage. La prescription peut comprendre: enseignement programmé, télévision, rubans magnétiques, simulateurs, leçon magistrale, séminaire ou tutorat.

La décision de créer et de mettre en oeuvre un nouveau programme pédagogique au niveau institutionnel est née à la suite des frustrations causées par les croyances et les attitudes courantes dans les milieux pédagogiques durant les soixante-dix dernières années. La conséquence de ces croyances a mené à une situation bien décrite par Bloom en 1968, quand il affirmait que "seulement un tiers des étudiants de la nation possèdent et maîtrisent les habiletés et les concepts qu'on leur a exposés à l'école, mais quatre-vingt-quinze pour cent sont capables d'acquérir cette compétence". Nous pensons que, si nous voulons changer cette situation, il faudra cesser d'utiliser les différences individuelles comme moyen de décider qui réussit ou échoue dans les compétitions de groupes. Nous devrons plutôt nous adapter aux différences qui existent dans les styles d'apprentissage, en utilisant diverses techniques pédagogiques, de façon à garantir le succès de l'individu dans son programme pédagogique.

De plus, nous croyons que l'usage du profil d'apprentissage nous permet de déterminer quels étudiants sont capables de bien apprendre à partir de la télévision, par exemple. Nous pouvons également déterminer quels étudiants auront des difficultés à apprendre en regardant la télévision, en lisant des manuels ou en écoutant des rubans magnétiques. Nous pensons simplement que les différentes composantes de la technologie éducative peuvent être utilisées pour assurer le succès de certains étudiants et qu'aucune composante n'est supérieure pour tous les étudiants.

Un des buts du maître est de diagnostiquer le style de l'étudiant, de déterminer ses points forts et de commencer son instruction en faisant usage des media qui vont miser sur ses points forts. Un étudiant à l'aise devant une présentation filmée sur la mitose devrait pouvoir disposer de ce film et ne pas perdre son temps à écouter un cours magistral, où les aspects qualitatifs sont absents.

Le problème consiste donc à assortir le style d'apprentissage d'un étudiant au style du mode de présentation de l'information. A ce jour, nous avons établi le profil d'apprentissage de 17,000 étudiants de l'Oakland Community College et nous avons créé des centres de prescription grâce auxquels le style d'apprentissage et le mode de présentation peuvent être assortis.

1.0 LES SCIENCES PEDAGOGIQUES COMME CADRE DE REFERENCE

Le développement de programmes d'études personnalisés a été fondé sur des hypothèses nouvelles et sur un cadre de référence neuf. Nous avons utilisé The Educational Sciences (Hill, s. d.) comme une structure d'ensemble à l'intérieur de laquelle il est possible de conduire des recherches portant sur les aspects fondamentaux du processus concret de l'éducation. The Educational Sciences fournit un cadre conceptuel et un langage scientifique au champ de la pédagogie appliquée, cadre qui possède un niveau de prévision comparable à celui qu'on trouve dans le champ de la médecine, de la pharmacie, du génie, du droit et des techniques infirmières. Il est dorénavant possible d'articuler les problèmes et les phénomènes à la façon d'une "vraie science" et, en conséquence de réduire la communication inadéquate ainsi que de la mauvaise interprétation et de la fragmentation qui en découlent dans le domaine de l'éducation.

Les postulats suivants sont essentiels aux sciences pédagogiques:

1. l'homme est un être social qui a la capacité de donner un sens à son environnement et à ses expériences personnelles

2. ne se contentant pas seulement des satisfactions biologiques, l'homme utilise des symboles dans sa quête de signification.
3. ces symboles prennent leur sens dans les expériences culturelles de l'homme.

2.0 LA PROGRAMMATION PERSONNALISEE DES ETUDES[1]

L'Oakland Community College a donné suite au besoin d'une conception plus personnalisée de la pédagogie, et il a développé un système coordonné d'enseignement par prescription individuelle. Les composantes de notre programme pédagogique personnalisé peuvent être résumées comme suit:

L'orientation symbolique théorique

Peut être déterminée par des questions dans les:

- tests d'aptitude verbale
- tests d'intelligence
- tests de lecture
- tests de mathématiques

Les déterminants culturels

Exemple de questions:

Parmi les énoncés suivants, choisir celui qui "vous ressemble le plus" et celui qui "vous ressemble le moins":

a) être libre de faire ce que je décide

b) suivre le conseil donné par des proches parents

c) avoir l'appui et l'approbation des autres

L'orientation symbolique qualitative

Mesures directes:

Marcher sur une ligne; assembler un bloc à tranches ondulées;

Faire une boucle.

Les modalités d'inférence

Exemple de questions:

Si vous deviez démontrer à un groupe de jeunes une méthode pour résoudre un problème de mathématiques nouvelles, quelle serait à votre avis la méthode la plus efficace?

1) l'enseigner comme à l'école où les méthodes sont démontrées par le professeur?

   a) premier choix b) deuxième choix

2) faire remarquer les différences entre la nouvelle et l'ancienne méthode d'enseignement des mathématiques

   a) premier choix b) deuxième choix

a) Administration des tests diagnostiques et détermination des profils d'apprentissage. Il s'agit d'abord de découvrir de quelle manière l'étudiant utilise les symboles pour résoudre des problèmes, comment il utilise ses sens et les processus d'inférence lorsqu'il est aux prises avec une situation qui, pour lui, n'a pas de signification réelle. Comment cherche-t-il un sens à son environnement? Est-ce qu'il préfère écouter ou lire, voir les choses uniquement par rapport à lui-même, ou se demander comment elles sont perçues par ses camarades ou par les membres de sa famille; ranger par catégories, ou établir des contrastes ou des rapports entre les éléments de l'information? Ces données du test diagnostique servent à donner le profil d'apprentissage de chaque étudiant.

b) Établissement d'une prescription pédagogique personnelle. L'étape suivante consiste à établir une prescription pédagogique personnelle à l'étudiant, dans le but d'assurer son succès au cours.

c) Présentation en classe des concepts et aiguillage vers un centre de prescription. Après un court débat donné par un professeur, l'étudiant se rend à un ou plusieurs centres de prescription, tels le laboratoire d'apprentissage individualisé et programmé, les stations d'apprentissage, le centre des ressources d'apprentissage ou le séminaire. Il peut aussi étudier tout simplement de façon individuelle.

d) Une approche unifiée permet de contrôler le rendement par l'administration des tests. La coordination entre les leçons et les tests nous permet de déterminer si un étudiant a maîtrisé le contenu d'une leçon avant qu'il ne passe à la leçon suivante. La rétroaction continuelle fournie à l'étudiant et au professeur par les centres de prescription peut même mener à une modification de la prescription personnelle.

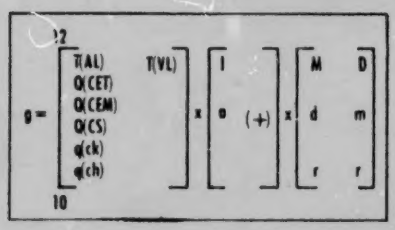
e) Modification de la prescription pour assurer le succès. L'objectif global est d'assurer à l'étudiant un niveau de réussite de 90%.

2.1 Administration des tests diagnostiques

Les étudiants qui s'inscrivent à l'Oakland Community College subissent une batterie de tests d'une durée de trois heures. Certains tests mesurent les abstractions subtiles, certains mesurent la coordination manuelle et visuelle, d'autres classifient les réponses sensorielles, d'autres encore indiquent des caractéristiques personnelles.

Ces tests permettent de relier le style d'apprentissage de chaque étudiant à l'ensemble du processus éducatif. Ces tests sont évalués par des professionnels bien formés, qui établissent alors un profil d'apprentissage de l'étudiant.

2.2 La détermination du profil d'apprentissage



Exemple d'un profil d'apprentissage

Le style d'apprentissage de l'étudiant est déterminé[2] par la façon dont il prend conscience de son milieu total, par sa façon de comprendre et de s'informer. Est-ce qu'il est un auditeur ou un liseur? Est-ce qu'il tient compte uniquement de son propre point de vue ou est-il influencé dans ses prises de décision par sa famille et ses camarades? Est-ce qu'il raisonne en catégories, tel un mathématicien, ou en relations, comme le font les professionnels des sciences sociales?

Ce ne sont là que quelques exemples des aspects de la personnalité humaine dont tient compte le style d'apprentissage d'un étudiant. Le milieu familial, le talent, les expériences acquises, ainsi que les buts personnels font que chaque individu est unique. Chaque profil, comme chaque étudiant, est différent.

En plus d'identifier les moyens qui permettent à un étudiant de maîtriser une tâche pédagogique, le profil d'apprentissage permet aussi à l'étudiant d'acquérir la connaissance de soi essentielle au choix d'une carrière. Le style d'apprentissage n'est pas immuable. Il peut être amélioré. Des aptitudes absentes, requises par une occupation spécifique, peuvent être créées à partir des points forts existant chez l'étudiant.

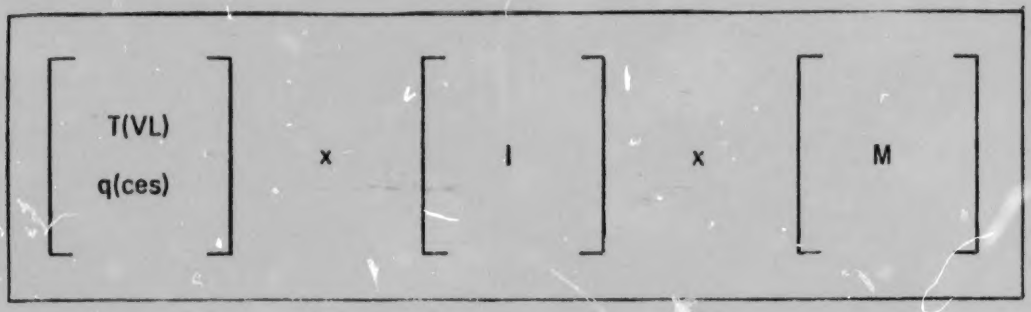
Une équipe formée de professeurs et de l'étudiant lui-même se sert du profil d'apprentissage ainsi que de l'information subjective recueillie lors d'une entrevue confidentielle, pour construire un programme pédagogique personnalisé qui tient compte des points forts ainsi que des faiblesses de l'étudiant. Ce programme constitue la prescription pédagogique personnelle de l'étudiant et a pour but de promouvoir son succès. On utilise un ordinateur pour accélérer les processus.

2.3 L'aiguillage vers les centres de prescription

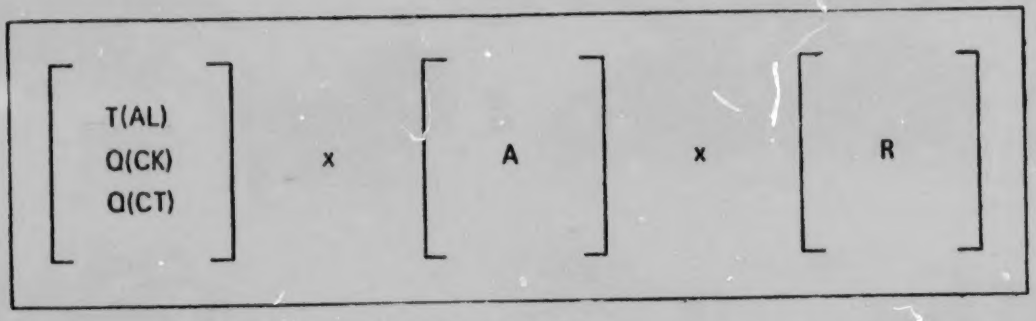
L'enseignement peut impliquer des types d'assignation qui peuvent varier d'un étudiant à l'autre. Les traditionnelles salles de classe et de conférence ne sont que deux méthodes parmi plusieurs. Au Oakland Community College, les étudiants ont un choix à faire.

Un étudiant qui a besoin d'un développement structuré et séquentiel peut travailler avec un matériel programmé, sous la supervision d'un professionnel, progressant ainsi selon son rythme personnel. L'étudiant stimulé par la dynamique des sessions de groupe peut participer à des sessions libres facilement accessibles avec des professeurs et des étudiants. L'étudiant qui préfère avoir un rapport personnel et individuel avec ses professeurs peut travailler au cours de rencontres avec son professeur.

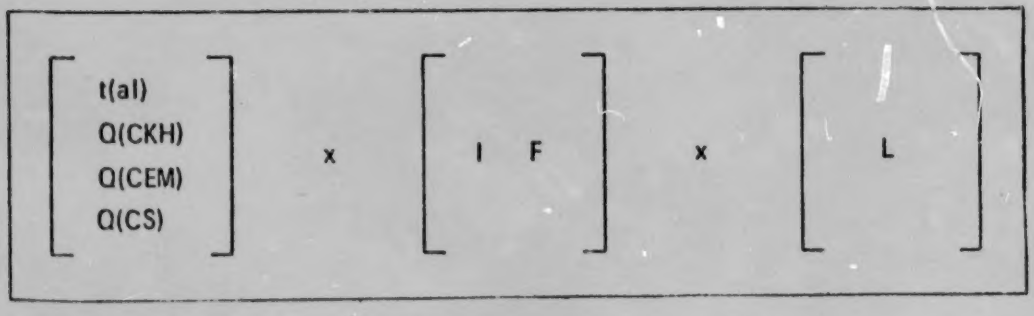
EXEMPLES DE PROFILS INDIVIDUELS DU STYLE D'APPRENTISSAGE



Individualiste - type catégorique qui lit
seul fréquemment



Grégaire - type relationnel qui recherche
activement des camarades pour discuter



Ne lit pas - habile, sensible, individualiste,
type évaluateur qui attend de l'aide
de sa famille

Les étudiants qui travaillent bien avec l'aide d'étudiants plus avancés peuvent être assignés à des tuteurs-étudiants. Chaque étudiant reste responsable du contenu de son cours, mais il peut choisir n'importe quel mode d'enseignement approprié à ses besoins, à ses aptitudes, ainsi qu'à son style d'apprentissage.

Les cours à horaire régulier restent cependant une partie essentielle du système pédagogique et les professeurs demeurent le principal point de référence de l'étudiant. Cette programmation flexible, qui met la réussite à la portée de chaque étudiant, implique un équilibre bien dosé entre les compétences professionnelles, les outils scientifiques et l'équipement.

Pour les activités d'aiguillage des étudiants, l'environnement est constitué des stations d'apprentissage individuel, du centre des ressources d'apprentissage, ainsi que du laboratoire d'apprentissage individualisé et programmé.

2.4 Le laboratoire d'apprentissage individualisé et programmé

Le laboratoire d'apprentissage individualisé et programmé est destiné aux étudiants qui préfèrent travailler seuls plutôt qu'en groupe. Ici les étudiants utilisent des textes programmés, ainsi que d'autres matériaux hautement organisés, sous la supervision des membres du corps professoral spécialement entraînés aux techniques d'enseignement individualisé. Les étudiants reçoivent ainsi les conseils de spécialistes pour résoudre des problèmes précis.

Lors de sa première visite au laboratoire, chaque étudiant se soumet à des tests diagnostiques qui servent à préciser son programme de travail. Les étudiants qui ont des problèmes perceptuels peuvent être encouragés à utiliser des machines de lecture programmées, des tachistoscopes portatifs, des appareils d'auto-correction de langage ("language masters"), ainsi que d'autres appareils spécialisés. Tous

les étudiants peuvent regarder de leur propre initiative des films fixes, étudier et manier des maquettes en trois dimensions pour clarifier des concepts abstraits.

2.5 Les stations d'apprentissage

Les stations d'apprentissage sont de grands espaces destinés à l'étude personnelle, à la discussion en petit groupe et à des sessions de répétition. Le programme en est conçu par les membres du corps professoral. Un personnel différent, surtout constitué de paraprofessionnels utilisés dans un rôle de support, aide les étudiants, qui peuvent ainsi travailler de leur propre façon et selon leur propre rythme.

Les stations d'apprentissage contiennent diverses ressources audio-visuelles. Les étudiants peuvent avoir des cours enregistrés sur bande magnétoscopique, écouter des rubans magnétiques, voir des films ou étudier du matériel didactique à l'aide d'autres appareils audio-visuels.

De petits groupes d'étudiants se réunissent pour des séances informelles de discussion avec leur professeur et des personnes ressources. Plusieurs centres de prescription différents peuvent fonctionner en même temps dans le même espace, grâce à l'utilisation d'écouteurs sans fil.

Les étudiants qui réussissent bien en groupe se rendent compte que les stations d'apprentissage constituent un cadre dans lequel il est agréable d'étudier.

2.6 Les étudiants répétiteurs

Les stations d'apprentissage sont également le lieu où se déroule le programme des étudiants répétiteurs; celui-ci permet à des étudiants d'avoir normalement accès à l'aide d'autres étudiants. Des étudiants qui ont déjà maîtrisé le contenu d'un cours sont entraînés par le personnel professionnel à devenir des répétiteurs. Aux étudiants intimidés par les

situations formelles, les étudiants répétiteurs fournissent une voie informelle dans une atmosphère moins traumatisante.

Parce que les étudiants répétiteurs se souviennent avoir également éprouvé des problèmes avec le contenu d'un cours, ils sont souvent en mesure de détecter plus facilement les difficultés et de suggérer des solutions auxquelles même un professeur expérimenté n'aurait pas pensé.

Les étudiants répétiteurs sont payés par le Collège. Le progrès de chaque étudiant est signalé au personnel professionnel et la rétroaction est transmise à son prore programme personnalisé d'instruction.

2.7 Les séminaires

L'étudiant stimulé par la dynamique des interactions de groupe peut participer à des sessions peu formelles avec des professeurs et d'autres étudiants. D'autres étudiants peuvent préférer une rencontre avec un professeur qui présente plus l'image paternelle et avec lequel ils se sentent plus en confiance. L'étudiant qui s'entend mieux avec un professeur seul à seul peut travailler avec celui-ci lors de rencontres individuelles.

2.8 Étude personnelle - Le centre des ressources d'apprentissage

Une autre structure importante pour le programme personnalisé d'éducation est le centre des ressources d'apprentissage - un endroit qui favorise les études et les recherches libres. Ce centre inclut la bibliothèque du collège, mais il offre plus que les services traditionnels d'une bibliothèque. Il s'agit d'un centre qui rassemble une grande diversité d'ensembles didactiques comprenant des microfilms, des étalages spéciaux, du matériel de recherche sous des formes diverses.

Les membres du personnel dépassent leur strict rôle de bibliothécaire. Ils aident activement les étudiants à résoudre les problèmes

reliés au contenu des cours. Comme dans le cas des autres centres d'instruction personnalisés, il y a rétroaction, afin de garder continuellement à jour la prescription éducative de l'étudiant.

Essentiellement, le centre des ressources d'apprentissage est cependant l'endroit où l'étudiant capable de travailler librement se trouve son coin à lui.

3.0 LES RESULTATS

À ce jour, nous avons déterminé le profil d'apprentissage de 17,000 étudiants, et nous avons utilisé ces profils dans des classes d'orientation générale des étudiants de première année collégiale pour les aider à se comprendre par rapport au rendement scolaire.

Nous avons conçu et réalisé quatre laboratoires d'apprentissage individualisé et programmé. Cette réalisation a comporté l'engagement du personnel enseignant ainsi que leur entraînement aux aspects propres de l'instruction individualisée. Nous avons conçu et aménagé des stations d'apprentissage pour les sciences sociales, l'anglais, la psychologie, l'histoire, la biologie, les mathématiques ainsi que pour l'électronique, l'automobile et les systèmes de contrôle climatique. Environ 30% du collège est présentement engagé d'une manière ou d'une autre dans les programmes d'études personnalisés (PEP).

Un exemple frappant des résultats qu'on peut attendre du système a été démontré par un programme de sciences sociales dans lequel 93% des étudiants ont reçu les notes A, B ou C. Jusque là le taux de réussite n'avait été que de 64%. Nous avons récemment réalisé un film de 18 minutes intitulé la personnalisation des programmes d'études par l'utilisation du profil d'apprentissage pour présenter le processus complet

aux nouveaux étudiants et corps professoral dans le cadre d'un programme de formation continue. On peut emprunter ce film en s'adressant au:

Vice-président, Academic Affairs
Oakland Community College
2480 Opdyke Rd. Bloomfield Hills
Michigan 48013, U.S.A.

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A P P E N D I C E

GUIDE SUCCINCT POUR LA DETERMINATION DU STYLE D'APPRENTISSAGE

LES SYMBOLES ET LEUR SIGNIFICATION

Deux types de symboles, théoriques (p. ex., des mots et des nombres) et qualitatifs (p. ex., des données de codes) sont fondamentaux dans l'acquisition de la connaissance et de la signification. Les symboles théoriques se distinguent des symboles qualitatifs par le fait qu'ils présentent à la conscience de l'individu quelque chose de différent de ce qu'ils sont eux-mêmes. Les mots et les nombres sont des exemples de symboles théoriques. Les symboles qualitatifs sont les symboles qui présentent, puis représentent à la conscience de l'individu ce qu'ils sont eux-mêmes. (Sentiments, engagements et valeurs sont des exemples de la signification communiquée par les symboles qualitatifs).

Il y a quatre symboles théoriques:

1. T(AL) - Théorique audio-linguistique - le son d'un mot;
2. T(AQ) - Théorique audio-quantitatif - le son d'un nombre;
3. T(VL) - Théorique visuo-linguistique - le mot écrit;
4. T(VQ) - Théorique visuo-quantitatif - un nombre écrit.

La signification des symboles qualitatifs procèdent de trois sources:

- les stimuli sensoriels;
- les codes culturels (jeux);
- les effets programmatiques d'objets.

Il y a quinze symboles qualitatifs. Cinq sont associés aux stimuli sensoriels.

1. Q(A) Qualitatif-auditif - habileté à percevoir la signification par l'ouïe;

2. Q(O) Qualitatif-olfactif - habileté à percevoir la signification par l'odorat;
3. Q(S) Qualitatif-gustagif - habileté à percevoir la signification par le goût;
4. Q(T) Qualitatif-tactile - habileté à percevoir la signification par le toucher;
5. Q(V) Qualitatif-visuel - habileté à percevoir la signification par la vue;
6. Q(P) Qualitatif-proprioceptif - on s'y réfère parfois comme étant le sixième sens - habileté à synthétiser de nombreuses médiations symboliques pour l'exécution d'une tâche complexe;
7. Q(CEM) Qualitatif-code empathique - habileté à se mettre à la place d'une autre personne, à s'identifier avec les sentiments, idées ou la volonté de l'autre;
8. Q(CES) Qualitatif-code esthétique - habileté à jouir de la beauté d'un objet, d'une situation ou d'une idée;
9. Q(CET) Qualitatif-code éthique - engagement face à un ensemble de valeurs, face à un groupe de principes moraux, d'obligations et/ou de devoirs;
10. Q(CH) Qualitatif histrionique - habileté à démontrer délibérement un sens dramatique et l'émotion ou du tempérament pour produire des effets particuliers sur d'autres personnes;
11. Q(CK) Qualitatif-code kinésique - habileté à communiquer par les fonctions non-linguistiques telles que les expressions faciales et les mouvements du corps (les sourires et les gestes);
12. Q(CKH) Qualitatif-code kinesthétique - habiletés motrices;
13. Q(CP) Qualitatif-code proximique - habileté à juger de la distance physique et sociale appropriée entre soi-même et autrui telle qu'elle est perçue par ce dernier;
14. Q(CS) Qualitatif-code synnoétique - connaissance objective

de soi-même (selon les formes qualitatives et théoriques) en relation avec son milieu.

15. Q(CT) Qualitatif-code transactionnel - habileté à maintenir une interaction positive de communication qui influence d'une façon significative les buts des personnes engagées dans cette interaction.

LES DETERMINANTS CULTURELS

Les significations que l'homme attribue aux symboles forment et sont formées par sa culture. Les principales influences culturelles ou les déterminants culturels de la signification des symboles sont la famille, les associés et les individus:

- F - Famille
- I - Individu
- A - Associé

LES MODES D'INFERENCE

Les modes d'inférence utilisés par une personne dans le processus pour dégager une signification sont les suivants:

M - Magnitude: suggère une forme de pensée catégorique qui utilise des normes classifiées par catégories et des attitudes acceptées comme vraies par l'individu comme base pour l'acceptation ou le rejet d'une hypothèse émise.

D - Différence: suggère une tendance à penser par contrastes de un à un par comparaisons de caractéristiques ou de mesures choisies.

R - Relation: considère les relations entre deux ou plusieurs caractéristiques ou mesures.

L - Appréciation: considère, en leur donnant un poids égal, les hypothèses des modes d'inférence précédents (magnitude, différence et relation), avant d'arriver à une conclusion probable.

ANNOTATIONS

[1]Voir tableau "Programme d'études personnalisés".

[2]Voir en appendice: Guide succinct pour la détermination du style d'apprentissage.

SOME PERSPECTIVES ON INDIVIDUALIZED INSTRUCTION

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A major trend in basic education and skill training today is the gradual transition from group instruction to individualized instruction. Persons responsible for these programs are starting to realize that instruction can never be maximally effective when it is oriented toward similarities among students. Instead, it must be organized to account for differences. After all, every student has his own unique interests, abilities, experiential background and learning style.

Like most proposals to improve instruction, however, the proposal to individualize has been perceived quite differently from institution to institution. Numerous approaches, all claiming to achieve the same goals, have been adopted. For example, in observing the methods used by different institutions, one might find either the instructor or the students, or the instructor and students together, making decisions about any or all of the following aspects of learning: (a) the objectives to be achieved, including their scope and sequence; (b) the learning activities, materials and resources to be used; (c) the time allotted to working in each subject area, as well as to achieving each objective; and (d) the procedure to be used for both pre-assessment and, later, intermediate and final evaluation.

This description in itself implies the possibility of numerous ways to "individualize" instruction. Therefore, it is easy to understand why educators considering a break from traditional approaches are sometimes bewildered. It is not the intention to add to this already-existing confusion; rather, by clearly distinguishing between group and individualized instruction and providing a rationale, this method can be set into a context where it may be realistically examined by administrators and instructors.

Group vs. Individualized Instruction

The terms "individualized learning" and "individualized instruction" are often used interchangeably. Hence, one might assume that a fundamental difference between conventional group instruction

and individualized instruction rests in how learning takes place. This, however, is not the case. Although "teaching" might commonly be described as occurring within a group situation, "learning" always takes place within the individual. Moreover, the occurrence of learning is, among other things, contingent upon the presence of certain internal conditions. The student must be motivated and free of devastating physical and psychological barriers, possessing certain previously learned capabilities.

Where the basic difference between group instruction and individualized instruction does occur is in the learning environment, as a result of the way in which conditions external to the student are controlled and managed.

In group instruction, through lectures, question-and-answer sessions and other techniques, the instructor provides most of the instructional events which will eventually result in achievement of the program's objectives. In individualized instruction, more of the instructional events are provided by the learning activities, materials and other resources.

There are additional differences. Since materials incorporated into the program do more of the direct teaching, individualized instruction depends to a lesser extent on the instructor's role as a major provider of information. Instead, more emphasis is placed on diagnosing with students what is needed; helping them to gain access to experiences needed; monitoring more closely student progress; and providing greater remedial, tutorial and other assistance.

By using sources other than the instructor to provide information, there is also a greater opportunity to provide for variations among students in what is learned, how it is learned, and when it is learned. As well, there is more opportunity among students for variations in the time taken to achieve a desired learning outcome. A more detailed discussion of these fundamental differences between conventional group instruction and individualized instruction follows.

Rationale for Individualized Instruction

The rationale for individualized instruction is based firstly on knowledge of learning. It is a unique process governed, not only by conditions in the learning environment, but also by a variety of internal states of the student. As Burns points out in his article on "Methods for Individualized Instruction"[1], no two learners:

- achieve at the same rate;
- achieve using the same study techniques;
- solve problems in exactly the same way;
- possess the same repertoire of behaviors;
- possess the same pattern of interests;
- are motivated to achieve to the same degree;
- are motivated to achieve the same goals;
- are ready to learn at the same time;
- have the same capacity to learn.

Since even the simplest forms of learning require the presence of certain internal activities, group instruction in the manner of the traditional classroom makes little sense as the primary method of arranging and managing the learning environment. Consider the example of an instructor giving a lecture to a class of twenty students. At the time it is presented, only one or two students may be able to recall the required prerequisite information. Others may not be ready to attend to the new learning material or to follow the instructor's directions. Still others, because they did not raise their hands when the instructor was asking questions about the new material, may never know whether they have learned it correctly -- or even learned it at all! It should be obvious that alternative procedures are desirable — procedures which emphasize and recognize more effectively the fact that learning is an individual matter.

The second reason for considering individualized instruction is based on what is now known about providing the events of instruction. Basically, these events consist of a set of communications to the student in the form of oral or printed verbal statements, the

purpose being to make it possible for the student to proceed, for example, from "where he/she is," at the beginning of a lesson, to the achievement of the capability identified as the lesson's objective. More specifically, the events of instruction are designed to:

- gain the student's attention;
- inform the student of the objective;
- help the student recall prerequisite learnings;
- present the new material to be learned;
- provide guidance to the student in mastering the new learning material;
- evoke performance;
- provide feedback to the student on the correctness of performance;
- assess subsequent performances;
- aid the student in retaining and transferring the new learning material.[2]

Experience has shown that many of these functions may be more efficiently and effectively carried out through various types of well-designed instructional materials with which the learner interacts in a one-to-one relationship. For example, in presenting new material, evoking performance, and providing guidance and feedback to a student, individual methods are likely to produce better results than group ones. Similarly, for such tasks as problem-solving, acquiring information and acquiring motor skills, learning will be enhanced if the student is able to work on individual exercises rather than group exercises.

But this is not to suggest that group instruction should be completely eliminated from an individualized instructional plan; if it were, the program would probably fail. For one thing, lectures, films, audio-tapes and television presentations add variety. Group instruction can also be used for gaining attention, motivating students, and providing a model for performance; groups are certainly essential when oral communications, exchanging ideas and group problem-solving are the objects of the lessons.

To some educational practitioners, the above discussion of the rationale for individualized instruction might appear to be too coldly scientific. After all, what individualized instruction purports to do is put into practice research findings on learning and instruction. It recognizes that learning is an individual activity which comes about as a result of the student's interaction with the environment. But its occurrence is always contingent upon proper conditions, both internal and external to the student, being present at that time.

Is there not another reason — a less scientific one, perhaps — that might be given for individualizing instruction? Indeed there is! In the final analysis, individualized instruction is a more humane way to approach what is for many students an onerous task by allowing realistic objectives to be set for each student. A variety of activities, materials and resources are provided for use in achieving objectives; individual learning styles and backgrounds are taken into consideration. It enables the student to progress at his or her own rate. It provides a degree of privacy when difficulties are encountered together with consistent and appropriate feedback to the student on the correctness of his performance.

Surely, then, individualized instruction must spare students some of the frustrations and humiliations experienced as a result of group instruction, as well as minimize many of the traditional problems of classroom control.

First, because more attention is paid to the student's needs, interests and capabilities, there is a higher motivation to achieve success. Second, the method itself is designed to promote success in learning. This becomes rewarding in itself and motivating for continued effort. Third, because the instructor spends less time "teaching" the group as a whole, there are fewer opportunities for students to engage the attention of the entire class through that popular pastime known as "teacher-baiting." On the other hand, there are fewer opportunities for the instructor to engage the attention of the entire class through public ridicule of poor work or by employing

sarcasm. Thus, just as the method discourages "teacher-baiting," it also discourages the development of a teacher-student adversary relationship. It reminds the instructor that the goal is to promote learning rather than to perform on a platform performance or manipulate group psychology. Similarly, the major responsibility for learning and achievement is placed on the student.

Needed Components of Individualized Programs

There are many variations of individualized instruction in existence to meet the differences inherent in students, instructors, programs, (both content and objectives); and instructional settings. Then too, some institutions have far more resources available to them. All of these factors ultimately affect decisions that are made about managing instruction. But regardless of the degree to which a program is individualized, attention must be given to: (1) the development of appropriate learning materials; (2) the development of procedures for keeping track of materials and monitoring student progress; and (3) the training of instructors in the method to be used.

(1) Development of Materials

Contrary to popular belief, massive curriculum redesign projects are not always needed to change from group instruction to individualized instruction. After all, it is not "what is to be learned" that necessarily changes; rather, it is the way in which "what is to be learned" is presented to the students that changes. In other words, the delivery system is altered.

But this altered delivery system does require that certain things be present in the curriculum that is used for the program. It requires the specification of objectives at a level that will enable (1) needed materials and learning experiences to be determined; (2) diagnostic tests to be developed; (3) hierarchies of sub-objectives to be determined; (4) programs of studies for each student to be set up; and (5) instructor functions to be analyzed. It also requires that objectives be ordered or sequenced in a way that will permit students to acquire the necessary skills and competencies before

moving to a next hierarchical step for which present learnings are a prerequisite.

Assuming that these components are present — and indeed, they should be present in any good curriculum — where is attention directed in making a change from group to individualized instruction? It should be directed to the place where instruction is to be delivered, the classroom. Let us focus our attention, therefore, on the smallest segment of an instructional design effort — the "lesson" in group instruction and its counterpart the "module" in individualized instruction.

In preparing to present a "lesson", attention is given to three components: (1) a performance objective to show what students will be able to do when they complete the lesson; (2) techniques, materials and exercises which will implement the instructional events and stimulate recall of previously learned capabilities or information as required; and (3) some form of appraisal to determine when students have achieved the objective. These same components must also be considered in designing "modules," and it is most important to do so. One advantage that group instruction does have over individualized instruction is that it enables an instructor to redesign "on the spot" if difficulties are encountered. Modules, which are set into print or some other medium, do not permit this flexibility.

But here the advantages end. Modules, unlike lessons, do not disappear when the instructor stops talking since they can be used over and over again in the classroom by students when they are ready for them, not just when the instructor is ready to make a presentation. They can be reviewed or repeated as required and eliminated if the student already has the required skills and competencies. They provide the instructor with more accurate information on students' progress than it is possible to obtain through informal, oral quizzing; and provide students with a permanent record of what they did since their responses to any evaluation are usually in written form.

Within the confines of the required components for modules, there is room for considerable latitude in both content and format. The choices range from developing highly structured materials that are, in effect programmed instruction packages, to writing brief learning activity guides that require students to make extensive use of other resources such as books and films. There can be one kind of learning material for each objective or several kinds of learning materials from which students can choose. Length can vary from a couple of hours to several months.

Of the three components of modules, probably the most important is the inclusion of valid and reliable performance evaluation devices. These are required, regardless of the degree to which the program is to be individualized, to initially place students at an appropriate "level" within the subject area. The extent to which students have already mastered some of the things to be learned within a module must be assessed, including mastery of the objectives of a module and diagnosis of learning difficulties.

(2) Management of Individualized Instruction

Specially designed materials are needed for an individualized program. But so are management procedures to keep track of these materials, to keep the system going, and to monitor student progress.

When individualized programs are implemented — whether pacing, content or materials are individualized — group reporting and management becomes ineffective. Instead, individualized systems must be developed and employed. Thus class lists must be replaced with folders, sheets, and forms for each student. Basically, the materials and procedures employed will more closely resemble those used in hospitals than those traditionally used in schools. That is, each student's progress is documented individually. Some institutions have implemented extremely effective systems which employ a multi-copy form which is initiated on enrollment, kept up-to-date by adding new information while the student is on course, and completed on termination. The multi-copy procedure facilitates communication of results for certification.

Necessary, too, are procedures and materials to enable the student to monitor progress against course objectives. Effective use has been made of course charts which are kept by the student. Both the instructor's and student's documents are valuable counselling tools, if used appropriately when discussing goals and progress.

Good management of materials and equipment can best be achieved simply by good housekeeping and mutual co-operation. Often a variety of materials are used. These must be stored effectively but at the same time must be accessible when required. Sufficient copies are required and good storage and display practices are essential. This can be greatly facilitated by having all materials in the classroom and stored in specific places by subject or module.

The instructional system is essentially maintained by documented communication between the instructor and the student. A technique called a prescription has been effectively used — a set of instructions to the student that usually includes the objective to be completed, the materials to be used, and the follow-up activity. It serves as a directive and a historical record of what the student has done. It also serves as an important element in the instructor's control of the activities and progress of the student.

Individualized instruction has often been referred to as "laissez-faire." Unless there is an adequate procedure such as a prescription to expedite the management of the instruction, this term is often justified.

(3) Training of Instructors

A number of well-designed individualized programs have failed. Why? Often, a major reason is that the program designers have overlooked the need to train instructors to assume new roles.

In an individualized program, instructors have to serve in two essential roles: as managers or program administrators, and as facilitators or individual tutors and counsellors.

As managers, they must: schedule, coordinate, and control all required equipment and learning materials; assign, schedule, and coordinate individual, small-group and large-group activities; monitor the progress of all students, making sure that they have completed the work and done it correctly; test and evaluate individual achievement of the program's objectives and compile records; and evaluate feedback data on the effectiveness of the learning materials, equipment and techniques.

Even more important, however, are their roles as facilitators of learning. They must: diagnose individual learning needs and prescribe appropriate experiences; provide individual tutoring and counselling help when difficulties are encountered; stimulate motivation and give constant encouragement; help students to develop a sense of responsibility for their own learning; and encourage students to assume responsibility for helping one another.

Roles such as the ones discussed are a far cry from lecturing, trying to get everyone's attention at once, deciding who should be promoted, and grading papers on a curve. Therefore, it is sheer folly to expect instructors to be competent — and comfortable — in assuming these roles without assistance. Indeed, an administrator who does attempt to introduce individualization without providing adequate training can expect to find two things when walking into a classroom to check on progress — the instructor and students hidden under a sea of learning materials, and coming from under that sea of learning materials, the familiar voice of the instructor lecturing to the students!

It is important to train instructors. But it is equally, if not more, important to assist students to take on their new roles. Throughout their school years they have been the recipients of group instruction and, like their instructors, are well acquainted with its procedures. For many of them, the prospect of assuming a major portion of the responsibility for their own progress and that of their classmates may be both frightening and upsetting. They, too, must become familiar with the new program and be given ample opportunity to

practice the new procedures before they are put completely on their own. Again, unless this is done, even the most sincere attempts to introduce individualization will result in frustration and chaos for both students and instructors.

Summary

Learning is an individual experience. Instruction is effective when learner differences rather than similarities are recognized. A curriculum design which focuses on learning is an essential base for individualized instruction. The instructional design should include provision for unique learning rates, learning capacity, readiness and motivation. As well, it should include provision for continuous evaluation of progress and for accurate feedback to the learner.

The system requires a new role for the instructor as a manager of the learning environment. The management role includes evaluation, administration, counselling and structuring a variety of learning experiences. It also requires procedures for management and materials to document student progress. The new roles for the instructor require orientation and training. Students, too, must be oriented to manage their own learning and accept responsibility for it.

If the objective is to teach people, the courses including methods, techniques and materials must recognize that people are unique. An orientation to teaching people instead of courses is a major step towards effective instruction.

NOTES

1. Richard W. Burns. "Methods for Individualized Instruction", Educational Technology, Vol. 11, No. 6, June 1971, p. 55.

2. Robert M. Gagne. "Learning and Communication". In R.V. Wiman & W.C. Meierhenry, eds., Educational Media: Theory into Practice. Columbus, Ohio: Merrill, 1968, pp. 93-114.

COGNITIVE STYLE MAPPING
IMPLICATIONS FOR UTILIZATION

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Cognitive style mapping is in imminent danger of coming to a sudden possibly painless death unless the advocates of the Educational Sciences become far more seriously concerned with the practical utilization of the mapping science by the classroom instructor. The proponents of cognitive style mapping have shrouded the practical aspects of this innovation in a cloak of theory and jargon, thus failing to provide real-world applications for the instructor-user. If we are not to witness such a death, we must immediately begin to provide potential users with the practical information necessary to use cognitive style mapping rather than continuing to theorize on the subject.

To apply cognitive style mapping as an instructional tool, an educator must have three major prerequisites:

1) a sound knowledge of cognitive style mapping theory, terminology, technique and interpretation;
2) absolute mastery of the diagnostic-prescriptive elements of individualized and group instruction; and,
3) a broad understanding of educational resources pertaining to cognitive style, particularly with respect to identification, recognition and utilization.

Attempts to apply cognitive style before attaining these prerequisites will result only in questionable applications of the science but also in a network of dismal confusion.

Knowledge of Cognitive Style Mapping

Theory: While we may bemoan the over-emphasis on the theories of the Educational Sciences generally and cognitive style mapping specifically, we cannot escape the need for some basic theoretical experience. It takes no great

pedagogic wit to realize that students learn in different ways: our weakness in the past has been our failure to take advantage of different student learning styles to enhance our teaching methodologies. We have become so involved with our personal teaching styles that we have forgotten that students, for self-preservation, must necessarily learn either with us or despite us.

Cognitive style mapping has provided us with a theoretical framework within which to take a fresh look at education. No longer is it valid for teachers to say in March, "How I could have helped Joe if only I had known this about him last September." A major intention of the science of cognitive style is to provide, simply and efficiently, as much educationally relevant information as possible about all the Joes as soon as possible after they have begun a course of studies. On this basis, Joe's teachers can work with him on a more informed footing to decide, or at least discuss, methods of reaching him educationally.

Language: Evolving from cognitive style mapping theory, but hardly theory in itself, has been a definitive educational language. Perhaps the severest difficulty teachers have had in discussing students, either generally or specifically, has been the lack of mutually understood educational language. We have kidded ourselves that words like "motivation," "behavior," "attentiveness," and "dependability" are meaningful words in our profession. But lack of specific usage has reduced them to such a level that no two educators are likely to interpret them in exactly the same manner. Consequently, such words are of little value in discussing specific educational problems. Perhaps for this very reason cognitive style mapping has produced a short but totally new terminology which may be one of cognitive style's most significant assets.

If all educators can be convinced to use this vocabulary consistently within the guidelines specified in the current writings about the science, we should be able to speak in mutually understood terms. Educators' semantic disagreement about the stated meanings of the new language should not be an impediment to consistent interpretation as long as we agree to put our semantic differences aside and continually return to rigor. Other "scientists" have been successful in doing exactly this to solve international language barriers. Why should "educational scientists" not be able to make similar communications advances?

Technique: Once the language of cognitive style mapping has been conquered, implementors of cognitive style will require a broad base of mapping technique. The most expedient method of attaining such expertise is to engage individuals with practical experience in this area. Some actually do exist in this country! A more time-consuming method is to research existing studies and documentation. Experience indicates that the latter is costly not only financially but also in terms of implementation harmony. We can get so bogged down in the intricacies of the dissertations available on the topic that classroom application becomes an after-thought. And except on an intellectual level, there is little merit in a science that has no practical use.

Before mapping can actually occur, devices that test for the mapping elements must either be obtained or constructed. We should be aware that it is highly improbable that the test instruments for one institution will be adequate in another without alteration and revision, since population differences will affect test outcomes.

Because of the foregoing, implementors of cognitive style mapping in the past have been criticised by statisticians and test and measurement specialists.

But the science is still in its nascent stages and statistical information is still scanty. More unfortunately, it has proven substantially impossible to convince test and measurement people that the proponents of cognitive style are not hiding behind a facade of duplicity when they explain that test-instrument validation is a lesser issue until more information is known about the science itself. We can only assume that the test measurement experts have been so ingrained in the tradition and rigidity of education that to cite instances of educational innovation is beyond comprehension. Recent studies have shown the validity and reliability of cognitive style test instrument in measuring growth of the individual within himself (edumetric) rather than in comparison with a group (psychometric).

A method of translating test results into a cognitive style map needs to be devised. Obviously, computer utilization facilitates this problem once algorithms have been established. Print-out design and map content are well-documented in current literature on cognitive style mapping.

Interpretation and Application: Although the mechanics of mapping technique obviously provide a clearer understanding of the cognitive style process to the teacher-user, many of these mechanics are superficial to the user per se and no intimate knowledge is required. In many instances, understanding the specific details of computer input will simply result in the user being swamped by these complexities.

The user's main concern should be the interpretation and application of maps to the educational surroundings in which he participates. This assumes the prior acquisition of the theory and language of cognitive style mapping. Actual mapping techniques are of lesser concern. However, in the same way

that a cognitive style map is depicted as an algebraic equation with one set the multiplier of the next (a situation in which ignoring any one set or treating it as zero would make the entire equation equivalent to zero), a meaningful discussion of map interpretation must be carried out with some knowledge of diagnostic-prescriptive elements and educational resources.

Generally, however, interpretation and application of mapping can only be mastered by practice. The most difficult phase for the user, after theory and language, is gaining a sense of credibility in the maps themselves. The temptation to disbelieve is enormous. Essentially, this confidence can be gleaned in one of two ways, both of which are valuable. A user can accept the maps as relative truth and empirically validate the map contents by working with the students. If a map does not seem to be validated empirically, further information must be obtained or the map must be altered.

An alternative method is to ignore the hard-copy map for a period of time, empirically map the student, and construct another map. Once this has been done, compare the empirically-derived map with the computer-generated one. If the latter is accurate, the empirically obtained version should be very similar in content.

While the foregoing techniques are suggested only to gain confidence in mapping accuracy, an educator would be lax in his duties if he did not continuously empirically map his students, using his knowledge of cognitive style and his prior teaching experience. We have found, after several years of mapping practice, that the agreement factor is surprisingly high.

Many potential implementors have expressed fears that a student would be locked into his map (a computer contrivance) for the duration of an educational

program. This is not the case. An instructor should feel free to make map changes that seem appropriate, particularly when colleagues give their concurrence. Ideally a student should be re-mapped several times a year, not only since changes based on normal maturing are expected, but also because it is one aim of instruction to create occasional changes in cognitive styles.

Interpreting map symbology relevant to a symbol's individual meaning is less difficult than applying such symbology to an educational situation. An instructor is confronted with the following statements and questions: "I have a student. I have his map. I understand the map's symbols. How do I apply these symbols to this student? How do I maximize this student's strengths? How do I teach this student? How do I approach this student's learning problems?" At this point the application of cognitive style mapping breaks down as long as the science is kept isolated. Cognitive style mapping is not an educational end in itself.

Diagnosis and Prescriptions: Mapping, in contrast to other educational entities, is an insufficient tool and cannot be used effectively until a learning problem has been identified correctly. It is in this area of educational diagnosis and prescription that educators appear to be remiss.

Educational diagnosis and prescription, as a concept for solving learning problems, is based on the medical practioner's practice of diagnosing his patient's illness and prescribing an appropriate medication to assist in curing the illness. Hopefully, medical doctors use better judgement both in diagnosing and prescribing than educators have used. Too many educators diagnose according to the disease they would like to treat rather than what the student actually suffers from. This is akin to a doctor saying, "I know he has

a skin rash, but this is my gall-bladder day so it'll have to come out."

Teachers generally have been unable to diagnose specific "illnesses" effectively. The recent utilization of behaviorally-stated learning objectives has improved diagnosis somewhat, but unfortunately the majority of these objectives are so generally stated they are of little value in focusing on specific learning problems. In many cases we still do not know definitively what we expect our students to be able to do, consequently, we do not know what to look for when something appears to be amiss.

It was once thought that if we could break down all teaching materials into small enough points or lessons (some of us called them behavioral objectives), it would be relatively easy to identify precisely what a student was doing wrong. The intention was noble. Many educators, institutions and commercial enterprises generated unit after unit of behaviorally-stated--much of it was not--individualized courses. In one sense this task was healthy. Some people actually were interested in attempting to improve our education system! In another sense, however, it blinded us to the fact that creating small steps per se does not teach us how to diagnose at which step a student is failing. In many ways we created our own blindfold, cure-all prescriptions.

The advent of programmed learning packages yielded courses broken down into units, modules (items) and objectives, accompanied by pre-tests and post-tests. A pre-test was administered to determine how much the student knew: instructing a student in areas in which the pre-test indicated the student already had acceptable comprehension was obviously a waste of time. Thus pre-tests allowed us to diagnose "exactly" what objectives a student needed to master.

Unfortunately, along with these learning packages came pre-typed "diagnostic" prescriptions. For example, if the student cannot do Unit II-Item IV-Questions 1, 3 & 7, then administer diagnostic prescription XYZ. Prescription XYZ provided further work on 1, 3 & 7 only if the student was fortunate enough to have a somewhat discerning instructor. More often, the prescription covered all of Item IV rather than just the objectives that needed more study. Since the student had to do the work, it was obviously easier for an instructor to give a blanket item prescription rather than analyze specific problems. This was justified by suggesting that the additional "non-diagnostic" prescription questions were related to the area of difficulty and therefor would not hurt! Without being test and measurement experts we realized that in all too many instances the prescriptive exercises did not even relate to the objectives that were tested.

Teachers using such methods have now placed themselves in the position of prescribing for Unit-Module (Item) numbers rather than for specific content learning problems. This is analogous to students using mini-calculators before they can perform basic arithmetic manipulations mentally. The calculator is so much quicker and more accurate and we really do not have to understand how it works... until something goes wrong with it, or we find we have been using it to solve the wrong problem, or getting the right answer for the wrong reasons. Instructors who depend on pre-determined prescriptions do not "diagnose" at all because they do not take into account the specific reason a particular student was unable to meet the criterion for a specific objective. In reality, what is being diagnosed, and hence prescribed for, is the fact that the student cannot perform a particular numbered objective. Little consideration is given to

the reasons for the student's faulty response or the ways in which this response was reached. Until instructors master effective diagnosis, they will never master efficient prescription.

One of the major realizations of cognitive style mapping is that students often fail to meet curriculum objectives for non-academic reasons. Among these reasons are such things as unspecific behavioral objectives, audio-visual perception problems, and the prescription of inappropriate educational resources. The latter is so intertwined with cognitive style that one cannot be discussed adequately without referring to the other.

Educational Resources: As well as gaining a clearer concept of the diagnostic-prescriptive elements of teaching, instructors will have to broaden their ideas of educational resources. Due to the enormous surge of audiovisual aid production over the past decade, educational and audiovisual resources have become synonymous while still being referred to as "mediated" resources. Any good dictionary, however, points out that 'mediated' in an educational sense, refers to the intervention of some person, thing or method by which some result can be brought about. In the case at hand, an example of this would be a student mastering a body of knowledge with the assistance of an audio cassette. Obviously, the utilization of an audio cassette falls within the definition, but audio-visual software does not compose the entire definition in itself. Many other mediated resources are available besides audiovisual ones.

Because of the ambiguous usage of the term "mediated" the term "educational" resources is preferable. These would include instructional mode, audio-visual, people and people servicing, computer and training resources.

Without a recognition of these various educational resources and an understanding of how their availability—or lack of it—places limitations on instructional methodologies, an instructor is going into battle without weapons.

Assuming the prior mastery of diagnostic-prescription techniques, the very essence of cognitive style mapping is the identification of available educational resources, in such a way as to apply them to the solution of learning difficulties. The integration of available educational resources with cognitive style map interpretation allows the science of cognitive style mapping to be a viable educational instrument for diagnosing and prescribing for the learning strengths of students.

Instructional mode resources are often over-looked as educational facilitators by instructors because as a group they appear to be an inherent part of pedagogy. We must, however, break this family into its separate parts and consider applying one or more of them towards the solution of individual learning problems. Essentially, the instructional mode resources are: lectures, tutorials, seminars, large group interactions, independent studies, and peer-teaching.

One of the first decisions that an instructor needs to make after diagnosing a student or group learning problem is in which instructional mode the prescription can best be carried out by the student(s) concerned. Cognitive style map interpretation will assist in making this decision. Will the student learn more effectively from a lecture or from consultation with his peers? Is a tutorial more appropriate for the student than a large group interaction? Perhaps the student should be given clear-cut instructions and left alone?

A technique called "matching" will permit an instructor to view his curriculum materials design in terms of these same instructional modes. For example, a programmed text is most likely the independent study mode; a complicated science unit may require explanatory lectures by its very design. It is possible to determine the percentage match existing between a student's preferential learning mode(s), according to his map, and the instructional mode of curriculum design, according to the "map" of a specific curriculum presentation. It is not within the scope of this paper to pursue cognitive style matching technique: this aspect is mentioned only to illustrate the depth to which decision-making in prescribing can be considered with complete justification. If we are to make adequate use of a student's learning strengths, it may well be wise to rely less on the teacher's preferred instructional presentation mode and insist more on reaching toward the strengths of the receiver, the student. After all, it is the student who is supposed to be learning!

Like students, curriculum and teachers themselves, audiovisual software can also be classed and cataloged according to instructional mode. However, the very nature of audiovisual materials may suggest that the instructor should be initially concerned with map interpretation of the major theoretical symbols: T(AL), T(VL), T(AQ), and T(VQ), as they may best be applied to the prescription of audiovisual software. Obviously, the prescription of a mathematics audio cassette to a student who has a major weakness in T' (AQ) would be inappropriate unless the intention is simply to strengthen. By the same token, it may be appropriate to prescribe a grammar video-tape to a student with major strengths in T(AL) and T(VL). This would be more the case if the videotape presentation used a relationship modality of inferential

reasoning and the student were a major R. A major F student might respond more positively if the videotape were family—or authoritarian—oriented in its presentation.

We need not list the audiovisual software available to educators today; such materials are both readily accessible and well-known. But we must insist that such resources are prescribed only as necessary to cure learning problems. We now show filmstrips to entire classrooms of students because we are restricted by the classroom itself, despite the fact that as few as ten per cent of the students may respond positively to and learn from filmstrips. We use mathematical overhead transparencies because departments insist on getting their money's worth out of the audiovisual budget rather than because student X is a T(VQ), a Q(V) and an M-R. We buy audio cassettes because they are "in" rather than because some students—not an entire class!—are major T(AL)'s and I's and just do not seem to respond to linguistic visual presentations in a group atmosphere. Similarly, the substantial reliance on the common textbook, in situations where audiovisual materials would be more appropriate, would lead an educator to believe that ninety per cent of our students are major T(VL)'s which is highly questionable!

If we acknowledge that students learn in different ways, have major learning strengths, respond differently under different instructional modes, and have unique learning styles, then it must follow that teachers will have to exercise a great deal more caution in the prescription of learning remedies.

Another educational resource ineffectively utilized by educators is the people and people-servicing resource. If educational institutions intend to pursue the concepts of cognitive style mapping, it will be an absolute requisite

to re-evaluate assigning both instructional and non-instructional personnel.

Despite earlier comments, we do not contend that all teachers should immediately be forced into applying the concepts of cognitive style mapping, or that all instructors should immediately cease using their time-tested instructional methods and become "converts to the art." There is an essential need for the traditionalist, the lecturer, the group-oriented teacher, and the interdependent-oriented instructor to remain as separate entities. In fact, the philosophy of cognitive style demands such individualization. Educators who choose to pursue cognitive style mapping as part of their educational philosophy must recognize this demand if they expect any degree of success in their new-found philosophy.

But cognitive style can be humiliating; experienced teachers find it most difficult to accept the fact that they may not be best people equipped "to teach" a particular student. Often, an inanimate, remote piece of celluloid, or a fellow colleague held in low regard for his particular instructional methods, can be more successful in solving a particular learning problem for a particular student. Effective cognitive style map utilization often means referring a student to a teaching colleague, another student, or to a people-servicing department such as a media centre. Interdepartmental consultation will have to occur and the sacrosanct rule that we do not cross departmental barriers must be broken. The mathematics department might even have to know what the communications department is doing! Consequently, instructors who are encouraged to adopt cognitive style mapping must be those who are prepared to accept inter-discipline involvement. Although the science of cognitive style can be used on an individual basis, successful application towards the solution of both students' learning difficulties and teachers' teaching difficulties is best realized when cognitive style is performed on a collective basis.

An effective method of bringing the users together is the creation of a people-servicing department such as a media-type center. Staffed with both instructional and technician level personnel, such a center can provide users with the essential services needed for front line support of teachers, students and administrators alike. Allied services for placement, instructional information, educational resources, and evaluation, integrated with cognitive style mapping, provide a unique educational management system for servicing both individual and group educational programs.

Computers are rarely thought of as resources. To the average educator, a computer is a somewhat mystical monster whose deadlines must be met to generate reams of computer-printouts which invariably lead to more inputs with their accompanying deadlines. The rapid increase in individualizing educational programs, however, has dictated greater computer use in managing such items as daily student progress reports, attendance reports and administrative financial records. Computer-assisted instruction provides the student and instructor with access to a vast array of educational programs, many of which are self-instructional. Computers have become too imposing a resource to be ignored.

To the user of cognitive style mapping, access to a computer provides an open door for the imagination. A computer can be used to process test data or produce maps. Curriculum objectives can be classified, stored and retrieved when and in the order required. Audiovisual resources can be coded and cross-indexed with curriculum objectives and cognitive style major-minor learning modes. Carefully designed computer outputs can provide instructors with rapid, accurate, usable information for immediate application to teaching situations. Hopefully, computerized data-banking will one day relieve teachers from the mechanical retrieval logistics

of education and permit their expertise to be used primarily for diagnosing and prescribing for their students' individual learning problems.

The final educational resource to be considered here is the training resource. In the past, teachers relied to some extent on summer courses, sabbaticals and evening extension courses to up-date themselves in their teaching specialty. Little opportunity existed for instructional staff team-training within an institution. Consequently, changing instructional strategies have not been disseminated, and an educational philosophy that denies pedagogic teamsmanship on a local level has evolved. This situation has been perpetuated by those specialty supervisors who are inclined to tell instructors how to teach a course rather than assist them in changing instructional strategy. Instructors have also been to blame for not demanding such "on-hands" assistance from their supervisors.

The creation of Educational Development Officers in the community college system will perhaps reverse this one-way specialist role in these institutions and result in actual instructional development at the classroom level. If the E.D.O's stay in their offices, they will be doomed to failure. If however, they become actively involved in classroom management, they will discover that teachers have pleaded for development assistance with just cause. In the realm of cognitive style mapping perhaps, E.D.O.'s can most influence educational strategies and promote a sense of teamwork within their educational institutions.

Except for the odd skeptic, most educators have accepted the concept and objectives of cognitive style mapping. The graver concern is, "Now that I have it, what do I do with it?" The difficulties facing implementors of cognitive style are easily understood; nevertheless, substantial Canadian expertise is readily available to those who believe such concepts should become part of their

educational strategy. We can read and discuss all we like, but unless more educators reach the implementation and utilization phases of cognitive style, the science will die. If educators permit this without a battle, they are without a doubt guilty of educational malpractice.

LE PROFIL D'APPRENTISSAGE, INSTRUMENT PRIVILEGIE POUR L'INDIVIDUALISATION ET LA PERSONNALISATION DU PROCESSUS EDUCATIF

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LE PROFIL D'APPRENTISSAGE, INSTRUMENT PRIVILEGIE POUR L'INDIVIDUALISATION ET LA PERSONNALISATION DU PROCESSUS EDUCATIF

1.0 LA NECESSITE DE PERSONNALISER LE PROCESSUS EDUCATIF

2.0 EFFORTS DE PERSONNALISATION DE L'ENSEIGNEMENT DANS DIVERS MILIEUX SCOLAIRES

3.0 LE PROBLEME A LA BASE DE L'ENSEIGNEMENT PERSONNALISE

4.0 UNE SOLUTION: LE PROFIL D'APPRENTISSAGE

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6.0 CONCLUSION

LE PROFIL D'APPRENTISSAGE, INSTRUMENT PRIVILEGIE POUR L'INDIVIDUALISATION ET LA PERSONNALISATION DU PROCESSUS EDUCATIF

Le constat de l'individualité de chaque élève n'est pas un fait nouveau et l'exemple le plus fréquemment cité pour le souligner est la démarche personnalisée utilisée par Socrate pour enseigner à ses disciples. Pourtant nombreux sont ceux qui reprochent aujourd'hui à nos établissements d'enseignement d'oublier ce vieux précepte par ailleurs jugé indispensable à une pédagogie capable de répondre aux exigences nouvelles d'un monde en pleine mutation.

1.0 LA NECESSITE DE PERSONALISER LE PROCESSUS EDUCATIF

Nous croyons que le Conseil supérieur de l'éducation a bien résumé le credo de la pédagogie "nouvelle" en soulignant que "Celui qui s'éduque est le moteur de l'activité éducative!"[1] Ce credo repose sur des principes que "depuis longtemps les psychologues et les pédagogues s'entendent à déclarer fondamentaux!"[2] D'après le Conseil supérieur de l'éducation, ils sont au nombre de trois. Nous en mentionnerons les passages caractéristiques:

a) "... l'apprentissage individuel est le seul qui soit authentique et véritablement efficace...

b) ... il faut que l'étudiant reçoive tout au long de son apprentissage, à chacun des pas qu'il accomplit, la confirmation de son succès ou de son échec et de l'information sur les raisons de sa réussite ou de son erreur...

c) ... il importe que l'étudiant jouisse de la liberté de progresser au rythme qui correspond à ses capacités et selon son cheminement individuel..."[3]

Pour être efficace, l'enseignement devra ainsi tenir compte du niveau de l'habileté, de la maturité, de la manière d'apprendre et des réactions de l'élève à l'intérieur de diverses situations d'apprentissage. Les exigences de l'efficacité sont donc toutes autres que celles rencontrées dans un contexte traditionnel, où tout l'effort éducatif découle de la présence du seul maître face à un groupe indéterminé d'élèves.

Malgré nos efforts importants et indéniables des dernières années pour rénover notre système scolaire, nous ne croyons pas que nous puissions affirmer nous être rendus au bout de notre logique éducative. La réforme scolaire du Québec a atteint le régime scolaire, les commissions scolaires, les cegeps, la formation des maîtres, etc., mais elle ne s'est pas encore transformée en véritable réforme pédagogique. Le régime scolaire affiche bien un faible credo dans les caractéristiques individuelles des élèves en instaurant des voies et des options graduées. Pourtant il s'agit toujours d'un enseignement global de groupe. Or, c'est précisément sur ce point que la réforme devrait poursuivre sa

logique, car "bâtir un système d'éducation axé sur une méthode commune d'apprentissage, c'est nier la différenciation des êtres et vouer certainement à l'échec une immense majorité d'élèves".[4]

Le Conseil supérieur de l'éducation l'a bien senti, puisqu'il affirme sans ambages "... nous ne croyons ni utile ni rentable que le système scolaire se rabatte sur la solution facile, inefficace et très onéreuse au plan financier de l'enseignement collectif. A notre sens, la réforme scolaire s'est engagée dans une impasse en négligeant ou en sacrifiant la démarche individuelle inhérente à l'expérience authentique d'apprentisage au fur et à mesure que se développe un enseignement de masse.. Le caractère individuel de l'apprentissage et du développement personnel est une énigme fondamentale de l'éducation. Il faut trouver les moyens de la respecter, même en période de grands nombres".[5]

2.0 EFFORTS DE PERSONNALISATION DE L'ENSEIGNEMENT DANS DIVERS MILIEUX SCOLAIRES

Il est assez difficile de situer avec précision les gestes posés au Québec en vue d'individualiser, ou mieux, de personnaliser le processus éducatif. Nous doutons qu'il y ait des endroits où l'on ait implanté de façon opérationnelle un système individualisé qui englobe un curriculum complet. Par contre de nombreuses expériences et tentatives d'innovation dans le domaine des techniques pédagogiques actives et individualisées ont été portées à notre connaissance. Nous n'avons certainement pas la prétention de vouloir en faire un inventaire exhaustif. Cependant, nous croyons pouvoir démontrer, exemples à l'appui, que le milieu scolaire du Québec réagit favorablement au courant d'idées qui

veut un changement de nos structures pédagogiques, et ce dans le sens d'une individualisation de l'enseignement.

La plus importante des tentatives dans ce domaine a sans doute été celle du Cégep Montmorency. Si la réalisation des ambitions premières s'est avérée ardue, sinon impossible, il n'en reste pas moins que la phase de préparation vient enfin de faire place à celle de la confrontation avec les étudiants. Il est trop tôt, bien sûr, pour tirer des conclusions de cette expérience. Sa seule existence cependant témoigne d'une volonté de mettre les techniques pédagogiques au diapason des exigences contemporaines. Montmorency a voulu individualiser tout son enseignement dans le contexte global de la technologie de l'éducation et, à ce titre, il occupe une place un peu à part. D'autres cégep, sans être aussi ambitieux, ont cependant emboîté le pas, tels par exemple les cégep Maisonneuve et Edouard Montpetit. Dans ce dernier, nous nous devons de mentionner en particulier la recherche originale sur le système LOGO menée par une équipe dirigée par Guy Montpetit. Il s'agit du pendant québécois des travaux entrepris par le Laboratoire d'Intelligence Artificielle du MIT sur les possibilités d'utiliser l'ordinateur dans l'apprentissage global des individus selon leurs facultés propres.

Les cégep nous paraissent, pour le moment, être les lieux privilégiés de l'innovation pédagogique issue des courants pédagogiques contemporains. Ils ne sont cependant pas seuls, car plusieurs commissions scolaires, tant locales que régionales, ont développé des projets et des expériences mettant l'accent sur l'individualisation de l'enseignement. Un projet qui nous paraît riche de possibilités, est celui mis de l'avant par la Commission scolaire régionale de Chambly avec son projet SEDUCATION. Il s'agit de convertir des écoles polyvalentes à

aires ouvertes en des systèmes globaux d'enseignement personnalisé. Plus modeste, la Commission scolaire régionale des Mille Isles expérimente depuis quelque temps déjà des formules d'enseignement individualisé.

L'université, quant à elle, poursuit ses recherches dans ce domaine selon des formules et des moyens très variés. Le Center for Learning and Development de l'Université McGill cherche très activement à promouvoir parmi ses professeurs des techniques d'enseignement plus souples et plus sensibles aux besoins individuels des étudiants. A l'Université du Québec à Montréal - le CAMTER poursuit des objectifs quelque peu similaires. A Québec, l'INRS - éducation a entrepris en collaboration avec le Ministère de l'Éducation, un projet de gestion de l'enseignement individualisé (projet SAGE). Au Service général des moyens d'enseignement, nos avons entrepris l'opération REPLI (Recherche en enseignement programmé livresque et informatisé) consacrée essentiellement à la personnalisation de l'enseignement.

Nous pourrions poursuivre notre énumération, parler du travail de Pierre Angers à Trois-Rivières, du projet Intégration du Service général des moyens d'enseignement. Cependant, comme nous l'avons indiqué, notre but n'est pas d'inventorier les expériences et les projets d'enseignement individualisé, mais plutôt d'indiquer qu'il y a des efforts significatifs entrepris à tous les niveaux du milieu scolaire. Nous voudrions toutefois signaler que ces efforts se poursuivent depuis un certain nombre d'années déjà. Dès la fin des années soixante, l'ancien Institut de Recherche Pédagogique avait organisé un colloque[6] sur l'enseignement programmé et l'enseignement assisté par ordinateur, au cours duquel une centaine de personnes activement engagées dans ce type d'enseignement avaient pu échanger

leurs points de vue sur le sujet. Plus tôt, l'Association canadienne d'éducation de langue française (ACELF) avait organisé un colloque sur les machines à enseigner.[7]

S'il n'est pas permis de douter de l'ampleur du mouvement tendant vers l'individualisation ou la personnalisation de l'enseignement, nous nous posons cependant des questions sur l'authenticité des diverses expériences tentées. En effet jusqu'à quel point a-t-on réussi à dépasser les simples aspects formels de l'enseignement individualisé en dégageant les traits caractéristiques pertinents à l'apprentisssage des individus auxquels les activités éducatives étaient destinées?

3.0 LE PROBLEME A LA BASE DE L'ENSEIGNEMENT PERSONNALISE

Lorsqu'on examine les caractéristiques d'un élève en vue de les mettre en relation avec une éventuelle prescription éducative, on considère en général trois volets très différents d'éléments:

1. l'étendue de la matière à enseigner que l'élève maîtrise déjà;

2. les pré-requis que doit posséder l'élève;

3. les aspects caractéristiques de la manière d'apprendre de l'élève que l'on peut mettre en relation avec les choix d'enseignement dont on dispose.

L'analyse de ces trois domaines nous permet d'entrevoir le comportement du s'éduquant tel qu'il existe avant la phase d'instruction ou d'enseignement. Par contre, à des fins strictement d'enseignement,

nous ne considérons que le troisième volet précité, puisque nous nous préoccupons seulement des différences qui sont particulièrement pertinentes au type de système d'enseignement qui a été conçu. Des capacités individuelles différentes exigent un traitement pédagogique différent. Le problème auquel fait face l'enseignement individualisé est donc celui de l'interaction entre les différences individuelles et l'environnement éducatif disponible.

Il est de plus en plus évident qu'un enseignement efficace dépendra de la mesure qu'on pourra faire des différences dans les caractéristiques d'apprentissage. Les genres de mesure qui s'imposent dépendront des options offertes par le système d'enseignement. Les traits prédictifs de réussite d'un étudiant dans un milieu d'enseignement rigide différeront de toute évidence de ceux qui prédisent le succès d'un étudiant dans un système offrant des cheminements multiples.

A la suite des travaux de Woodrow[8] il est par ailleurs devenu évident que les notions globales d'intelligence ne sont désormais plus des concepts scientifiques utiles pour décrire les caractéristiques du s'éduquant, car elles tendent à négliger et à obscurcir les différences individuelles spécifiques. Par contre, ce qui est plus important pour l'enseignement, c'est de déterminer les modèles d'habileté et de compétence qui interagissent avec l'apprentissage.[9]

Lorsqu'on sait où l'élève en est rendu dans son programme et qu'on lui reconnaît les pré-requis voulus à la poursuite de son apprentissage, on doit déterminer le cheminement d'enseignement qui s'adaptera le mieux à ses exigences personnelles afin de lui permettre de maximiser la maîtrise de l'objectif d'enseignement subséquent.

Il est donc du plus haut intérêt que l'on puisse mesurer les habiletés et les styles d'apprentissage. Dans la pratique, ce genre de diagnostic est posé par l'enseignant lui-même, ce qui suppose, bien sûr, qu'il ait le temps de faire des observations approfondies et qu'il puisse le faire dans des conditions favorables; cela suppose aussi, et surtout, qu'il ait un jugement compétent, nuancé et équilibré. Le moins qu'on puisse dire, c'est que, dans la plupart des situations, on constatera qu'il y a place pour l'arbitraire! Dans ce contexte, la solution serait de développer des instruments de mesure qui puissent facilement dégager les caractéristiques d'apprentissage dont ont besoin les praticiens pour faire les prescriptions pédagogiques. Il s'agit là d'un domaine où les accords se font au niveau du principe alors que la pratique continue à se contenter de l'intuition d'enseignants plus ou moins avertis. Le développement de procédures de mesure appropriées, que l'on pourrait appeler psychométrie du processus d'apprentissage, semble donc être d'une importance capitale.[10]

4.0 UNE SOLUTION: LE PROFIL D'APPRENTISSAGE

C'est justement dans le contexte que nous avons essayé de décrire, que se situent les travaux de Joseph E. Hill[11] et de ses collaborateurs. A partir des données recueillies au cours d'une séance de tests, il est possible de dresser le graphe du style d'apprentissage d'un individu. En d'autres mots, on établit l'image des différentes façons qu'à chaque être humain de chercher à comprendre. Le style d'apprentissage de l'individu est déterminé par la manière dont il tire une signification des choses et par la façon dont il cherche à s'informer. Écoute-t-il ou préfère-t-il lire? Est-il influencé par les opinions de sa famille et de ses pairs ou n'écoute-t-il que lui-même? Son raisonnement ressemble-t-il à celui du mathématicien ou à celui du sociologue? Autant de façons de procéder que le graphe du style d'apprentissage permet de discerner.

L'influence familiale, nos aptitudes, nos expériences et nos aspirations font de nous des êtres différents, uniques. Le profil d'apprentissage reproduit une partie des caractéristiques individuelles. Il permet ainsi de dégager les forces mais aussi les faiblesses de l'élève. Ce qui permet de concevoir un programme éducatif pour chaque individu basé sur ses points forts... et ses points faibles. En principe on peut alors concevoir un système qui s'inspire des acquis de la personne, et non pas de ses absences ou failles comme c'est le cas dans un milieu éducatif traditionnel.

Le profil d'apprentissage tient compte de plus d'une centaine de traits personnels caractéristiques que l'on trouve regroupés dans quatre grands ensembles:

1- les orientations symboliques;

2- les déterminants culturels;

3- les modes d'inférence;

4- la mémoire

L'utilisation de ces catégories s'avère extrêmement intéressante: la première indique la façon dont l'élève utilise certains types de symboles, son habileté à manier les mots et les chiffres, les symboles qualitatifs et les codes. La deuxième catégorie indique la manière selon laquelle l'élève est influencé pour dégager une signification des symboles; l'élève peut agir en individualiste, ou il peut rechercher l'opinion de ses parents ou de ses pairs. La troisième indique le modèle suivant lequel se fait le raisonnement de l'élève. Celui-ci peut penser en grandes catégories, en fonction des différences existant entre un sujet ou un autre, en fonction de relations qui existent entre les choses, ou encore de façon synthétique. Enfin, la

dernière catégorie concerne la mémoire, certainement un des aspects essentiels du processus éducatif.

Le profil d'apprentissage fait à ce sujet une distinction importante entre les fonctions de mémorisation proprement dite et les composantes affectives. Les fonctions de mémorisation sont de véritables processus tels la reconaissance, la rétention, le rappel et l'association alors que l'affectif est composé d'éléments qui contribuent à activer les processus de la mémoire elle-même. Ces éléments sont les personnes, les processus et les propriétés.

Étant donné la nouveauté et la complexité d'utilisation opérationnelle de cette dernière catégorie, il faut la manier avec grande prudence, dans des conditions expérimentales.

Les possibilités de regroupement entre les divers traits personnels atteignent plusieurs milliers de combinaisons différentes qui demanderaient - en principe - autant de prescriptions pédagogiques!

5.0 LES APPLICATIONS DU PROFIL D'APPRENTISSAGE

L'existence d'un profil d'apprentissage pour chaque élève permet d'envisager un certain nombre d'applications pédagogiques à tous les niveaux. Mais surtout elle permet de réaliser ce que les gens du Oakland Community College appellent le PEP (programme d'études personnalisé).[12]

La connaissance du style d'apprentissage d'un élève, et de ses principales lignes de force, permet aux enseignants de concevoir un programme d'instruction conçu spécifiquement pour cet élève. En plus de spécifier les matières scolaires et le niveau de performance attendu de la part de l'élève, il devient possible de concevoir les modes

d'apprentissage qui s'adaptent le mieux au "style" de l'élève. Si les symboles théoriques audio-linguistiques sont absents du profil d'apprentissage, il ne sert à rien de soumettre l'élève à un cours magistral. S'il est visuellement "fort", il sera peut-être préférable de lui faire voir un film; ou encore, s'il possède une personnalité individualiste et un mode d'inférence qui procède par catégories, il sera préférable de le faire travailler selon des méthodes d'enseignement programmé.

À Oakland, à la suite d'une introduction faite selon un enseignement magistral de type traditionnel, l'élève se voit offrir sept grandes voies dans lesquelles il peut s'engager pour apprendre:

1. enseignement programmé;
2. stations d'apprentissage ("carrels");
3. tutorat par des pairs;
4. centre de ressources éducatives;
5. séminaire complémentaire;
6. séminaire de rencontres informelles;
7. enseignement individuel.

L'organisation de l'enseignement en fonction du style d'apprentissage de l'élève est à notre avis l'application la plus prometteuse du profil d'apprentissage. Celui-ci permet cependant d'entrevoir d'autres possibilités, que le Oakland Community College a d'ailleurs exploitées. Ainsi il devient dorénavant possible de décrire les matériaux

didactiques (films, disques, vidéo, etc.) en fonction du style d'apprentissage. Cela oblige les concepteurs de matériel didactique à délaisser les communications de masse anonymes pour se concentrer sur l'analyse de la clientèle à laquelle on désire vraiment s'adresser. C'est un défi qui n'a malheureusement pas été relevé assez souvent.

Le profil d'apprentissage devient également un instrument passionnant pour l'éducateur en ce qu'il permet de discerner les styles d'apprentissage boiteux de leurs élèves. Connaissant les faiblesses, ou absences, dans le style d'apprentissage de l'individu, on peut appliquer un programme éducatif qui permettra à l'élève de se construire des traits cognitifs qui lui font actuellement défaut. De la sorte l'élève acquerra des moyens qui le rendront fonctionnellement plus indépendant. Cet aspect d'intervention dans le style d'apprentissage est plein de promesses à condition de le manipuler avec prudence et avec compétence.

Nous n'avons mentionné que trois types d'applications rendus possibles par le profil d'apprentissage. Il est certain qu'on pourrait aussi analyser les relations entre ce dernier et les styles d'enseignement, ou encore les styles administratifs correspondants.

6.0 CONCLUSION

La croyance aux vertus de l'enseignement individualisé est fortement ancrée chez nombre d'enseignants et d'administrateurs scolaires. On sait depuis un bon moment comment organiser des séquences ou des modules d'enseignement individualisé.

Malheureusement il était plus difficile de déceler les particularités de chaque élève, pour les exploiter ensuite d'une manière pédagogiquement adéquate.

Le profil d'apprentissage développé à Oakland nous semble être le premier instrument pédagogique opérationnel qui permette la mise sur pied d'un enseignement individualisé qui réponde aux problèmes pédagogiques concrets posés par ce type d'enseignement.

Le profil d'apprentissage n'est sans doute pas parfait, et ses auteurs le reconnaissent. Mais il nous semble être en avance sur tout ce qui a été conçu ailleurs dans ce domaine. Nous devons par conséquent nous y intéresser activement et non seulement sur le plan intellectuel. Agir autrement serait nous priver d'un outil rigoureux et prometteur.

ANNOTATION

[1]L'activité Éducative: Rapport Annuel 1969-70/ Conseil supérieur de l'éducation. - Québec: Editeur officiel du Québec, 1971. - p. 24-25.

[2]Ibid., p. 51.

[3]Ibid., p. 50.

[4]Avant-Projet du Plan SEDUCATION/ Ian Palkiewicz, Rénald Legendre, Jacques Desautels. - St-Lambert: Commission scolaire régionale Chambly. Service de recherche et de planification, 1973. - p. 13.

[5]Conseil supérieur de l'éducation, op. cit., p. 55.

[6]I.R.P. Échange 1/ Institut de Recherche Pédagogique. - Québec: Ministère de l'Education, 1970. - 63 p.

[7]Colloque sur les machines à enseigner, Montréal 1 et 2, novembre 1968.

[8]"The Ability to Learn"/ H.A. Woodrow. - Psychological Review, no. 53, 1946, pp. 147-158.

[9]Measurement in Learning and Instruction/ Robert Glaser and Anthony J. Nitko. - Pittsburg: University of Pittsburg. Learning R ≠ D Center, 1970. - p. 629. - (Reprint; 1971/9).

[10]"How Can Instruction Be Adapted to Individual Differences?"/ L.J. Cronbach. - in Learning and Individual Differences/ R.M. Gagné, ed. - Colombus (Ohio): Charles E. Merril, 1967. - p. 23-29.

[11]L'article de J. Hill, intitulé "les Sciences pédagogiques" donne une description détaillée du profil d'apprentissage.

[12]Pour plus de détails voir l'article de Nunney et Hill sur les Programmes d'études personnalisés.

COGNITIVE STYLE MAPPING, AN UNSURPASSED INSTRUMENT FOR THE INDIVIDUALIZATION AND PERSONALIZATION OF THE EDUCATIVE PROCESS

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The individuality of each student has long been recognized; the example most frequently cited is the personalized approach used by Socrates in teaching his disciples. Yet today our schools are being reproached for neglecting this long-established concept, which is nonetheless considered indispensable to an educational system aimed at meeting the unprecedented demands of an ever-changing world.

1.0 THE NEED TO PERSONALIZE THE EDUCATIVE PROCESS

We feel that the Superior Council of Education aptly summarized the creed of the "new" educational philosophy by pointing out that "the person seeking learning is the moving force behind all educational activity."[1] This creed is based on principles that both psychologists and educationalists have recognized as fundamental.[2] According to the Superior Council of Education, there are three such principles, that can be summarized as follows:

- individual learning is the only authentic and truly effective learning form;
- at each step of their education, students must be informed of, and given reasons for, their success or failure;
- the students must be free to proceed at their own pace, according to their abilities.[3]

To be effective, therefore, the educational system must take into account the students' ability, maturity, and method of learning, as well as their reactions to various learning situations. Thus the criteria for effectiveness are totally different from those encountered in traditional settings in which the educational effort consists solely of placing a teacher in front of an indefinite number of students.

Despite our undeniably intensive efforts in recent years to revamp the educational system, we do not feel that we have pursued our educational philosophy through to its logical conclusion. Educational reform in Quebec has affected the school system, school boards, CEGEPS, and teacher training, but it has not yet been translated into a genuine reform of teaching methods. The school system does indeed pay lip service to the individuality of students by offering graded streams and options. However, it still continues to dispense mass instruction. Reform logically should be conducted through the individualization process, since "to build an educational system based on mass teaching methods is to deny the differences between individuals and doom the vast majority of pupils to certain failure."[4]

The Superior Council of Education fully realized this, stating unequivocally: "We believe it is neither useful nor productive for the educational system to fall back on the facile, inefficient, and financially burdensome solution of mass education. In our opinion, educational reform has taken a dead-end road in the development of mass education by overlooking or sacrificing the individualized approach essential to a genuine learning experience. The individuality of each person's learning process and personal development is one of the fundamental mysteries of education. A means must be found to respect it, even at a time when mass movements prevail."[5]

2.0 EFFORTS TO PERSONALIZE TEACHING IN VARIOUS EDUCATIONAL INSTITUTIONS

It is difficult to identify precisely the measures taken in Quebec to individualize, or rather, personalize, the educative process. We doubt that an individualized system covering a complete curriculum has been implemented anywhere in the province. On the other hand, numerous experiments and attempted innovations based on active and individualized teaching techniques have been brought to our attention. Although it is not our intention to present a complete inventory of these, we can show that Quebec's educational circles are reacting favourably to the current of thought advocating changes in our educational structures that promote individualization of the learning process.

2.1 Recent Developments

The most important innovation in the above area unquestionably has been that of the Montmorency CEGEP. Although its initial ambitions have proven difficult—if not impossible—to fulfil, the preparatory phase of its project has now been replaced by actual work with students. Although it is too early to draw any conclusions from this experiment, its mere existence shows a willingness to adapt teaching techniques to conditions of modern society. Montmorency has tried to individualize its entire curriculum in the context of the educational sciences and consequently occupies a rather unique position. Other CEGEPs, for example the Maisonneuve and Edouard Montpetit CEGEPs, have followed its lead, but on a less ambitious scale. In connection with the latter CEGEP, we should mention specifically the original research on the LOGOS (Language for Optimizing Geographically Ordered Systems) carried out by a team led by Guy Montpetit. It constitutes the Quebec counterpart of the work undertaken by Massachusetts Institute of Technology's Artificial Intelligence Laboratory on the potential use of computers in the overall education of individuals.

At the moment, the CEGEPs seem to us the ideal breeding ground for innovations stemming from contemporary educational trends. They are not alone however, since several school boards, both local and regional, have developed projects and experiments emphasizing individualization of the learning process. One project that seems to have great potential is called SEDUCATION, developed by the Chambly Regional School Board. It involves the conversion of open composite high schools into comprehensive systems for personalized learning. The Thousand Islands Regional School Board also has been experimenting for some time on a more modest scale with formulae for individualized learning.

At the university level, research on this subject is being pursued with a wide variety of formulae and methods. McGill University's Centre for Learning and Developement is attempting to promote teaching techniques that are more flexible and more adapted to students individual needs. At the University of Quebec at Montreal, CAMTER (Centre pour l'application des moyens techniques à l'enseignement et à la recherche—Centre for Applying Technical Methods to Teaching and Research).

is pursuing similar objectives. In Quebec City, the educational branch of INRS (Institut national de recherche scientifique — National Institute for Scientific Research) has undertaken, in conjunction with the Department of Education, a project for the management of individualized learning (SAGE project).

We could describe the work of Pierre Angers in Trois-Rivières, or the Integration project of the Teaching Methods Branch. However, as stated earlier, our goal is not to itemize existing experiments and individualized learning projects, but rather to show that a major effort has been made at all levels of the educational community. We would also like to point out that this effort has been underway for a number of years. In the late 1960s, the former Institute of Educational Research organized a symposium[6] on programmed and computer-assisted learning at which a hundred or so persons actively engaged in this field were able to exchange their viewpoints. Before that, the Canadian Association of French Language Education (Association canadienne d'education de langue française)(ACELF) had organised a symposium on teaching machines.[7]

2.2 The Work of the Teaching Methods Branch

The needs and wishes of the various educational institutions in the area of individualized learning have not gone unnoticed by the Branch. Without wishing to prejudge either the merit of the numerous formulae for individualized learning, or the developments to which they might lead in the future, the SGME committed itself to individualized learning to the extent that it related to SGME's own concerns.

Since the mandate of the Branch is, among other things to ensure cohesive development of the use of teaching media in decentralized educational institutions, including the quality of instruction required, we developed a long-term work program to study the most advanced educational formulae involving the use of certain media.

Because we wanted to go beyond the mere use of audiovisual devices and deal with the incorporation of teaching media into the learning process, we tried to base our work on the concept of individualized and personalized teaching as developed by Oakland Community College in Michigan.

2.2.1 The Instrument-Equipped Learning Laboratory

Our initial goal was to set up an instrument-equipped learning laboratory (ILL) with two individual learning carrels, each containing a TV monitor, a slide projector, film loops, and cassette tapes. One of the carrels was also equipped with a videotape recorder. The two carrels are linked by cable with the learning resources centre and simply by making a telephone call, the student's monitor can receive any videotape or television film.

In addition to these two carrels, the ILL contains a Lektromedia 120 computer terminal (cathode-ray tube, random access visuals, and audiofiles), as well as two other computer terminals, plus more traditional audiovisual equipment.

In principle, the ILL should become a totally integrated automated system of individualized learning. Because we are primarily interested in teaching media, it is not within our scope to develop immediately a true system of personalized learning, which would include such important elements as youth tutoring, seminars, and general lectures. Initially, we shall concentrate on the more technological aspects of the educational process.

Our ILL is to be organized in such a manner that the student consults a terminal to establish his cognitive style, educational aspirations, prerequisites, and educational prescription. The prescription would then be filled by various forms of instrument-assisted learning such as the audiovisual tutorial, programmed learning, independent study, and computer-assisted and computer-managed instruction.

2.2.2 Operation REPLI

Our work in the more advanced fields has led us naturally to computer-assisted instruction. We have tried to coordinate the educational use of the computer with already existing educational tools (for example audiovisual devices and programmed learning).

Because the problems raised went beyond the bounds of a single research effort, we drew up an experimental research project that will enable us, or so we hope, to lay the groundwork for subsequent undertakings. This is how Operation REPLI (Recherche en enseignement programmé livresque et informatisé—Research on book-based and computer-based programmed learning) was born.

Programmed learning is at the root of what we now call educational technology in the widest sense, and it has evolved its own particular procedures, from the development of operational objectives to a formative as well as a summative evaluation. The effectiveness of programmed learning techniques has largely been proven.

However, it remains to be seen whether programmed learning techniques can be applied to computer-assisted learning. Because of its high cost, the latter will probably not become available to all students in the foreseeable future. It is therefore necessary to select students who stand a better chance of achieving success with computer-assisted learning, or who would be doomed to failure without it.

Among the various specific objectives of our research, one that most interests us is determining clients' cognitive style on the basis of their degree of success:

- in programmed learning (see the Oakland prototype);
- in computer-managed programmed learning; and
- in programmed learning based on scrambled textbooks.

Although there can be no doubt of the scope of the movement toward individualized or personalized learning, we nevertheless question the validity of the various experiments attempted. How successful have we been in transcending the merely formal aspects of individualized learning by identifying the cognitive style traits of those individuals for whom the educational activities were designed?

3.0 THE PROBLEM UNDERLYING PERSONALIZED LEARNING

When we examine a student's traits to prepare an educational prescription, we generally consider three distinct factors:

- the proportion of the subject already mastered by the student;
- the prerequisites the student must have; and
- the characteristics of the student's cognitive style that can be correlated with the educational options available.

An analysis of these factors gives us insight into the student's behaviour prior to the instructional or learning phase. On the other hand, for strictly educational purposes, we consider only the three above-mentioned set of factors, since we are concerned only with the differences that are particularly relevant to the type of educational system in effect. Each combination of individual capacities calls for a different educational program. The problem now facing individualized learning therefore, is the compatibility between individual characteristics and the educational formulae available.

It is becoming increasingly obvious that an effective educational system will depend on how well differences in learning traits are measured. The types of yardsticks required will depend on the options offered by the educational system. The criteria governing a student's success in a rigid educational setting obviously will differ from those in a system offering great flexibility.

Since the work of Woodrow,[8] it has also become obvious that the generally accepted ideas of intelligence are no longer useful scientific concepts for describing a student's traits, because they tend to overlook and obscure specific individual differences. On the contrary, it is more important for teaching purposes to determine the standard abilities and skills that are compatible with the learning process.[9]

When the student's program level has been established, and the prerequisites for pursuing his studies have been acquired, the prescription best suited to the student's personal requirements must be determined to maximize his chances of mastering the next learning objective.

It is imperative therefore, that the student's abilities and cognitive style are determined. In practice, this type of diagnosis is made by the teacher, which presupposes that he has the time to make in-depth observations under favourable conditions, and that his judgement is sound, finely-tuned, and balanced. Thus there is room for variation in most cases, to say the least! Under the circumstances, the solution would be to develop yardsticks that could identify readily the cognitive traits that teachers must know before preparing educational prescriptions. The need for such a solution is generally agreed upon in principle, but in practice the intuition of teachers continues to be relied upon. Consequently, the development of suitable yardsticks that could be called the psychometry of the learning process is of prime importance.[10]

4.0 A SOLUTION: THE COGNITIVE STYLE MAP

It is precisely in the framework we have attempted to describe above that the work of Joseph E. Hill[11] and his colleagues have been carried out. A map of an individual's cognitive style can be drawn on the basis of data gathered from test batteries. In other words, a picture of the diverse ways in which an individual searches for meaning is drawn. An individual's cognitive style is determined by the way he derives meaning from objects, and the manner in which he seeks to become informed. Is he a listener or a reader? Is he influenced by the opinions of his family and his associates, or is he concerned only with his own viewpoint? Does he reason as a mathematician or as a social scientist?

Our family background, aptitudes, life experiences, and personal goals make each of us unique. The cognitive map reproduces some of the subject's individual traits, thus enabling the student's strengths as well as his weaknesses to be identified. This in turn enables an educational program to be drawn up for each individual on the basis of his strong points as well as his weak ones. In principle, therefore, a system can be developed to emphasize a person's

positive qualities rather than his weaknesses, as is the case in traditional educational institutions.

The cognitive map takes into account over one hundred personal traits that are divided into four major groupings: symbolic orientations; cultural determinants; modalities of inference and memory.

The application of these sets of factors produces extremely interesting results. The first indicates the manner in which the student uses certain types of symbols, his ability to manipulate words and figures, qualitative symbols and codes. The second set indicates the influences that the student brings to bear in deriving meaning from symbols: he may be self-reliant, or he may seek the opinion of his family or associates. The third set indicates the manner in which he reasons. He may think in terms of broad categories, of differences or similarities between one object and another, or he may synthesize relationships. The last set concerns memory, indisputably one of the essential aspects of the educational process.

In this connection, the cognitive map makes an important distinction between the memory functions proper, and the concern components. The memory functions are complicated processes, involving recognition, retention, recall and association, whereas the concern components help activate the memory processes themselves. These components are persons, processes, and properties.

Given the unfamiliarity of the last set and the complexity of its practical application, it must be handled with great caution in experimental situations.

The various personality traits offer thousands of possible permutations and combinations that would call for—in principle—as many educational prescriptions!

5.0 APPLICATIONS OF THE COGNITIVE STYLE MAP

The fact that each student has an individual cognitive style enables a number of educational applications to be considered. Above all, it makes possible the creation of what Oakland Community College calls the P.E.P. (Personalized Educational Program).

A knowledge of a student's cognitive style and his/her chief strengths enables teachers to prepare a curriculum designed specifically for that student. In addition to specifying the subjects and the performance level expected of the student, it is possible to identify the educational methods best suited to the student's style. If the cognitive map includes no theoretical auditory linguistics symbols, there is no point in subjecting the student to a course of lectures. If the student is visually "strong", showing films would be preferable; on the other hand, if the student has a highly individualistic personality and a modality of inference based on a categorical thought process, programmed learning methods would be more suitable.

At Oakland, after an introduction involving traditional lecture-based learning, the student is offered a choice of seven broad channels through which to pursue learning: programmed learning; learning carrels; youth tutor training; learning resources centre; complementary seminars; "rap" sessions; and independent study.

In our opinion, the most promising application of the cognitive style map is to organize the student's curriculum around it. However, cognitive style mapping opens up other possibilities that Oakland Community College has already explored. For example it is now possible to describe teaching materials (e.g. films, records, and videotapes) as they relate to the cognitive map. This obliges teaching material designers to depart from the anonymous methods of mass communication and to concentrate on an analysis of the clientele to be served. Unfortunately, this challenge has not been taken up often enough.

The cognitive map is also a fascinating instrument because it enables the teacher to discover students' inadequate learning habits. Once their weaknesses are known, an educational program enabling students to develop the cognitive traits that they lack can be implemented. In this way, students will acquire greater functional independence. Such modification of the cognitive style is extremely promising provided it is handled with caution and skill.

We have mentioned only three of the possible applications of the cognitive style map. Obviously, the relationship between the latter and the corresponding teaching or administrative styles could also be analyzed.

6.0 CONCLUSION

A large number of teachers and school administrators firmly believe in the virtues of individualized learning. The organization of individualized learning units or modules has been known for some time. Unfortunately, discerning students' individual characteristics has been more difficult.

The cognitive style map developed at Oakland seems to us the first educational instrument to validate the implementation of an individualized learning system.

The cognitive style map is not perfect of course, as its designers readily admit. However, it seems to us more advanced than innovations elsewhere in this field. We should therefore develop an <u>active</u>—not merely an academic—interest in it. To do otherwise would be to deprive ourselves of a finely-tuned and promising instrument.

NOTES

[1]Superior Council of Education. L'activité éducative: Rapport Annuel 1969-1970. Quebec City, Quebec Official Publisher, 1971, pp. 24-25 The Council is an advisory body to the Minister of Education.

[2]Ibid., p. 51.

[3]Ibid., p. 50.

[4]Palkiewicz, Ian, Legendre, Rénald, Desautels, Jacques. Draft SEDUCATION plan, St-Lambert: Chambly Regional School Board, Research and Planning Service, 1973, p. 13.

[5]Superior Council of Education, op. cit., p. 55.

[6]Institut de Recherche Pédagogique. IRP Echange 1, Quebec City, Department of Education, 1970, p. 63.

[7]Colloque sur les machines à enseigner, Symposium on teaching machines, Montreal, November 1 and 2, 1968.

[8]Woodrow, H.A. The Ability to Learn, Psychological Review, No. 53, 1946, pp. 147-158.

[9]Glaser, Robert and Nitko, Anthony J. Measurement in Learning and Instruction. Pittsburg, University of Pittsburgh Learning R&D Centre, 1970, p. 629 (Reprinted September 1971).

[10]Cronbach, L.J. "How can Instruction be Adapted to Individual Differences?" in Learning and Individual Differences, R.M. Gagné Columbus, Ohio: Charles E. Merril, 1967, pp. 23-29.

[11]J. Hill's article: "The Educational Sciences", in this publication, gives a detailed description of the cognitive style.

APPLICATION OF COGNITIVE STYLE MAPPING

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"What is it?" "It sounds complicated." "How do you go about it?" "What is it going to do for me?" These are questions asked about a Cognitive Style Map.

Essentially, a cognitive style map presents a picture of how a person derives meaning from his environment. This map is obtained through the administration of tests. At Oakland Community College, where Dr. Joseph Hill and Dr. Derek Nunney developed mapping, all incoming freshmen are administered a three-hour battery of tests which measures both the students preferences and performance. Currently available at George Brown College of Applied Arts and Technology (CAAT), Toronto, is a one-hour interest inventory which can give information on the individual's preferred ways of searching for meaning. This is not as sophisticated or as accurate as the combination of preference and performance tests — but it is a beginning.

With a student's map the teacher can determine whether the student is a visual learner or an auditory learner. For the person who learns by reading, sitting through a lecture may be a real bore — unless he is provided with printed handouts, or can see things written on the blackboard or on an overhead. On the other hand the person who derives symbolic meaning by listening may have a difficult time trying to study from a textbook.

We can gain information on the method of decision making the student employs. Does he seek out the viewpoints of others or does he make decisions independently? How does he reason — logically, mathematically or analytically.

Each of us, because of our family background, our environment, our past experiences, and the goals we hope to achieve, is a unique individual. A map of one's cognitive style reflects that uniqueness and shows the instructor how the individual searches for and acquires meaning from his universe.

Obviously cognitive maps are not going to turn us into super teachers nor our students into perfect learners, but they may be a tool which can be used to improve our education experience. We have all had the experience of the student we could not reach, the student

we know should have done better, and the student who suddenly began improving with a change in teaching techniques.

Through mapping we may be able to spot those before they ever walk into our classrooms, rather than a month or two months into the school year. We may be able, based on the information in the map, to plan a program for the student which will enhance the learning experience and ensure his success. This may mean providing programmed packages or audio tapes. It may mean providing traditional lectures. It may mean transferring the student to another teacher's class — a class where the teacher and student cognitive styles may show a higher match. It may mean the difference between failure and success.

Listening to Dr. Hill, one repeatedly hears emphasis placed on the function of the cognitive style map as a diagnostic tool on which prescriptions can be based. Dr. Hill also cautions — and this is important — that it is only a tool; it is not 100 per cent effective and if your observations do not agree with what is on the sheet of paper, make your own judgements.

In making a prescription the teacher plans a program that will utilize the student's strengths to facilitate learning, but this is only one side of the coin. The other side is to find the areas that the student rarely uses in his search for meaning and to help him develop these styles, to augment and enrich his educational experiences.

If we can provide the student with a climate of harmony rather than dissonance, of success rather than failure, how much more effective the learning experience can be.

People tend to shy away from the jargon around mapping, discard it because it's new; but the seeds of cognitive style mapping were sprouting back in the 19th century when Soren Kierkegaard wrote:

> If real success is to attend the effort to bring a man to a definite position one must first of all take pains to find HIM where he is and begin there....the helper must first humble himself under him he would help, and therewith must understand that to help does not mean to be sovereign but to be servant, that to help means to endure for the time being the imputation that one is in the wrong and does not understand what the other understands...

> Instruction begins when you, the teacher, learn from the learner, put yourself in his place so that you may understand what he understands and in the way he understands it.

At the beginning of the past academic year, students from a few divisions within George Brown College (CAAT) wrote the interest inventory to determine their cognitive styles. I felt it was necessary to meet with each group for about an hour prior to their writing the inventory in order to allay fears that this was a "test", a win or lose situation. Most of the students needed reassurance that there was no "good" or "bad" value placed on the results, that this would in no way threaten their position in the class. I repeatedly emphasized that this was a method through which we could discover their unique ways of searching for meaning and facilitate success in their educational experience.

After the inventories were written and scored, another session of about two hours duration was held with students and involved faculty members present. At this session, each item on the inventory was interpreted with examples of how a particular score for the item might influence the student's approach to education. A class profile was also presented so that the students could see where they differed from and where they were similar to their classmates and the teacher.

It became immediately apparent that recognition by the instructor of the unique qualities of the students had a very positive influence on the teacher-student relationship. The group discussion also allowed for feedback from both students and teachers about how they would like their program to develop through the course of the year. Students were also made aware of the fact that if they encountered difficulties throughout the year, they could meet with the instructor and through utilization of the information on the cognitive style map make alterations in the use of instructional aids.

Later in the year, I discovered when talking with students who had been mapped, that many were assuming more responsibility for their own education, being more creative in project work, and communicating at greater depth and with more frequency with the instructor. In

speaking with teachers using mapping, I had several responses to its use. For one teacher, mapping was chiefly an affirmation that he was dealing with his subject matter in an appropriate style for that particular class profile. In addition, he is preparing new instructional aids for use in the coming year's program.

One teacher almost totally dispensed with the traditional lecture method upon discovering that her students disliked lectures and absorbed very little in such an atmosphere. The result was a division of the class into three small groups, one working with the teacher in a small informal discussion group, while students from the other groups worked independently or on a buddy system doing assigned projects related to case material covered in the informal discussion.

All of the teachers and students involved in cognitive style mapping this year felt that it was of value. These teachers intend to map incoming students in the future. Many other teachers who have heard of the results in these classes have approached me about mapping their students this fall. It appears that this year's effects of cognitive style mapping have been successful and have influenced others to add this to their instructional aids.

DESIGNING INSTRUCTION FOR ACCOUNTING STUDENTS USING THE TECHNIQUES OF COGNITIVE MAPPING

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Introduction

The cognitive style battery of tests developed by Oakland Community College was completed by forty-two students at Sir Sanford Fleming College of Applied Arts and Technology (CAAT), Peterborough, Ontario in the Business Division. The test was administered at the request of the Accounting Department teaching masters with the primary objective of screening students who might benefit from alternative learning styles to the traditional lecture-based mode.

At the time of writing (April 1975), the primary benefit has been an increased awareness of student learning problems by the teachers.

Mass administration of the mapping tests in a traditional college offering primarily lectured-based courses is a step that cannot yet be taken without additional study of test results and greater participation in the use of test results by other instructors.

Background

Most students at Sir Sandford Fleming CAAT study accounting in a traditional classroom setting with twenty or thirty other students. New material is presented through lectures. The balance of the time is taken up in problem-solving exercises. The accounting department began to experiment with alternative forms of study by offering a self-study program in accounting using audio-visual material. A laboratory, staffed by an experienced teacher was also created to allow students to deal with problems on a one-to-one basis.

Very mixed results were experienced with the self-study program. As well, some students appeared to benefit greatly from the accounting laboratory. Other students never used the facility. Teachers felt unequal to the task of counselling students into one learning mode or the other.

The teachers recognized their own interest in several areas:

- pretesting students to determine their suitability for alternative learning styles;
- increasing their awareness of student learning styles and difficulties;
- determining levels of ability as well as personal characteristics associated with success in each of the alternative learning styles.

A Solution?

The cognitive mapping concept (as developed at Oakland Community College) seemed to promise results which would meet wholly or partially the objectives already identified.

While the mapping concept was designed for use in a college with a different educational philosophy — an institution able to offer a fully individualized learning approach — it was believed the test could generate valuable output even in colleges following more traditional pedagogical approaches.

The Administration

The test administered at Sir Sandford was identical to that used at Oakland for post-secondary students. The test was completed by 35 of 80 students in a first-year business program. The results were returned to the students with an explanation of both the overall and individual test results.

The three alternative learning styles available to students at Sir Sandford were analyzed, yielding a map for each of the styles. These maps identified the ideal characteristics which a student should exhibit in order to master material. For example, the independent study mode was determined to best suit a student exhibiting a high degree of commitment to a particular set of goals and a tendency to enjoy working independently. On the other hand, the lecture approach was seen to be better suited to the student

exhibiting both an ability to experience another person's ideas and a tendency to look to an authoritarian figure for guidance and leadership.

At the time of writing, test results have yet to be thoroughly analyzed. A composite map is being prepared which may be useful in isolating certain characteristics common to many students at this college.

Conclusions

While the composite map referred to may yield interesting information, individual student maps will only be useful as instructors learn to use them as screening devices for students who wish to pursue alternative learning styles. The results may also prove useful as a diagnostic tool to treat learning disorders. There has yet been no opportunity at the time of writing to use the results in this fashion.

However, some other important benefits have accrued to the teachers involved in this experiment with cognitive style mapping. Teachers have a better understanding of, and a basis for feeling compassion towards, the student who does not respond to traditional teaching methods. Teachers have been forced to be quite specific about the characteristics which a student should exhibit in order to succeed in a particular learning mode. This has increased an awareness of the limitations of a single teaching style and encouraged teachers to experiment with other styles.

A Warning

Teachers are concerned about the consequences of administering the cognitive mapping test to all first-year business students. This concern centres around the length of the test and the degree of usage by instructors not acquainted with cognitive maps.

If it is determined that the maps are sufficiently powerful instruments to warrant widespread usage, then the challenge lies in persuading other instructors of this fact.

LE PROJET DE DETERMINATION DU STYLE D'APPRENTISSAGE AU CEGEP ANDRE-LAURENDEAU

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LE PROJET DE DETERMINATION DU STYLE D'APPRENTISSAGE AU CEGEP ANDRE-LAURENDEAU

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1.0 INTRODUCTION

Le Cegep André-Laurendeau, selon ses devis pédagoqiques, s'orientera vraisemblablement vers l'individualisation et la personnalisation de l'enseignement[1]. Dans ce sens, le Centre des ressources d'apprentissage jouera un rôle important dans la transmission des connaissances et dans leur assimilation par les étudiants, compte tenu de leurs caractéristiques individuelles. Aussi le Cégep André-Laurendeau soulève-t-il un véritable défi pédagogique.

Le projet de détermination du style d'apprentissage est apparu comme une mesure concrète susceptible d'aider à relever ce défi. En effet, il offrait la possibilité d'établir le profil d'apprentissage de chaque étudiant en précisant ses habiletés individuelles, et ainsi il fournissait les bases pour établir une prescription d'apprentissage individualisé et personnalisé[2]. Cependant, pour mieux situer le projet de détermination du style d'apprentissage, il apparaissait nécessaire de définir le phénomène enseignement, ou tout au moins de tenter de le faire. C'est alors que l'enseignement sembla devoir se définir comme un système composé de quatre systèmes[3]: l'enseignant, l'enseigné, l'enseignable, l'enseignage[4]. Dans ce contexte, le projet de détermination du style d'apprentissage devait porter principalement sur l'enseigné dans ses habiletés individuelles. En effet, le style d'apprentissage de l'enseigné surgissait comme un ensemble de variables indépendantes importantes dans la zone de convergence et de rencontre des quatre systèmes qui se conjuguent dans le phénomène enseignement.

Le présent texte expose d'abord une tentative de définition du phénomène enseignement défini comme un système de systèmes; puis, suit une présentation générale du projet de détermination du style d'apprentissage au Cegep André-Laurendeau.

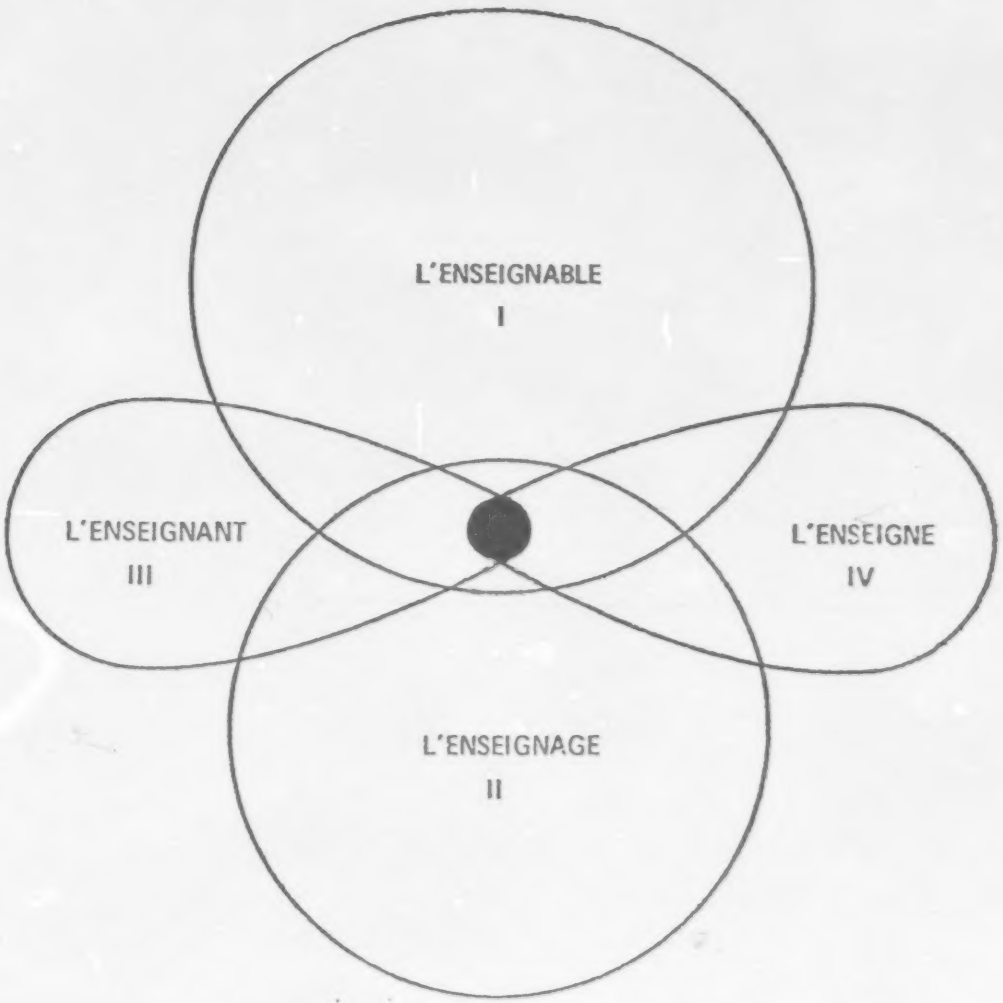

FIGURE I

L'enseignement comme un système de systèmes

Nous empruntons ce schéma à James B. Macdonald, Educational Models for Instruction – Introduction, in Theories of Instruction, 1965, p.4.

Ainsi, d'une part, il a semblé utile de présenter un système de conceptualisation du phénomène enseignement pour en avoir une vision statique et plutôt verticale. D'autre part, il a paru pertinent de se référer à un système d'opérationalisation de ce phénomène pour en avoir une vision dynamique et plutôt horizontale. Cette façon de procéder favorisait la compréhension du lien entre ces deux systèmes.

2.0 L'ENSEIGNEMENT, UN SYSTEME DE SYSTEMES

Il y a plusieurs façon de conceptualiser le phénomène enseignement. Il est ici proposé de la conceptualiser et de l'analyser à partir du concept système. Contrairement à ce que l'on a trop souvent tendance à croire, le phénomène enseignement n'est pas réductible aux seuls systèmes enseignant et enseigné, mais il comprend aussi les systèmes enseignable et enseignage. Il va sans dire que chaque système, composé d'un ensemble de variables indépendantes, est autonome en soi, mais devient dépendant dès qu'il est mis en place dans un système de systèmes, comme c'est le cas dans le phénomène enseignement.

2.1 L'enseignant

L'enseignant: c'est ce système de variables qui constituent celui qui pose l'acte d'enseigner, ou plus simplement celui qui présente les stimuli et/ou les indices qui ont pour objet de provoquer une réponse déterminée de l'enseigné. Ce système comprend plusieurs variables, entre autres les suivantes:

- la personnalité, définie sous forme de besoins, de tendances, d'aspirations, d'attitudes;
- l'expérience passé et présente;
- le système de valeurs;
- les habiletés individuelles, définies sous forme d'habiletés perceptuelles, mentales et mnémoniques;
- âge, sexe, etc.

Seulement certains aspects de ces variables entrent en ligne de compte au moment où l'enseignant pose l'acte d'enseigner.

2.2 L'enseigné

L'enseigné: c'est ce système de variables qui constituent celui à qui l'on enseigne et qui pose l'acte d'apprendre. Plus simplement, l'enseigné, c'est celui qui répond aux stimuli et/ou indices qui ont pour objet de déclencher chez lui un comportement déterminé. Ce système comprend plusieurs variables dont voici quelques-unes:

- la personnalité, définie sous forme de besoins, de tendances, d'aspirations, d'attitudes;
- l'expérience passé et présente;
- le système de valeurs;
- les habiletés individuelles, définies sous forme d'habiletés perceptuelles, mentales et mnémoniques;
- âge, sexe, etc.

2.3 L'enseignable

L'enseignable: c'est ce système de variables qui entrent en interrelation au moment de la planification d'un contenu de cours ou de programme de cours en vue d'une action future. Parmi celles-ci, il faut signaler les suivantes:

- un contenu de cours ou de programme de cours;
- les industries;
- les centres de main-d'oeuvre;
- les spécialistes concernés;
- les chercheurs, etc.

C'est à ce niveau que se détermine l'ensemble des stimuli qui sont systématiquement utilisés dans l'interrelation enseignant-enseigné.

2.4 L'enseignagne

L'enseignagne c'est ce système de variables techniques qui assurent l'interrelation enseignant-enseigné; c'est ce stimulus global à l'intérieur duquel se conjuguent des stimuli systématiques et des réponses spécifiques. Grâce à l'enseignage, l'acte d'enseigner tend à se confondre avec l'acte d'apprendre. Voici quelques-unes de ces variables:

- les moyens et/ou processus technologiques;
- les moyens et/ou processus pédagogiques;
- les moyens et/ou processus psychologiques, etc.

Quatre systèmes interdépendants constituent l'enseignement, défini comme un système de systèmes. Ces quatre systèmes convergent et se rencontrent dans une zone commune où l'acte d'enseigner de l'enseignant se conjugue avec l'acte d'apprendre de l'enseigné et où les stimuli de l'enseignable reçoivent le support des moyens et/ou des techniques de l'enseignage.

3.0 LE PROJET DE DETERMINATION DU STYLE D'APPRENTISSAGE AU CEGEP ANDRE-LAURENDEAU

Le projet de détermination du style d'apprentissage de l'enseigné, mis sur pied au Cegep André-Laurendeau, s'inscrit dans la suite des recherches sur le style d'apprentissage (cognitive style) effectuées aux États-Unis et principalement au Oakland Community College sous la direction du Dr. Joseph E. Hill et du Dr. Derek Nunney[5]. Il accepte d'entrée de jeu les quatre postulats qui fondent les Sciences pédagogiques dans leur ensemble et le style d'apprentissage en particulier. Les voici:

1. l'éducation est un processus consistant dans la recherche du sens[6];
2. la pensée est distincte du langage;

3. l'homme est un être social ayant la capacité unique de dégager du sens de son milieu et de ses expériences personnelles par la création et l'usage de symboles;
4. non content des seules satisfactions biologiques, l'homme est perpétuellement en quête du sens.

Ces quatre postulats mettent sur la voie d'une certaine compréhension sinon de la genèse des différences individuelles, compte tenu du donné héréditaire et de l'acquis postnatal, de l'environnement en général et de la culture en particulier, et des expériences personnelles heureuses ou malheureuses; tout au moins, ils mettent sur la voie de la compréhension de la signification empirique des différences individuelles dans une situation d'apprentissage en général et dans une situation d'apprentissage en milieu scolaire plus particulièrement.

La prise de conscience et l'acceptation du fait des différences individuelles commandent de prendre des mesures concrètes pour faire l'évaluation de celles-ci afin d'être à même de prescrire à chaque enseigné des formes d'activité pédagogique ou plus simplement d'apprentissage qui lui conviennent.

C'est pourquoi le projet de détermination du style d'apprentissage se présente avec une portée non seulement théorique, mais aussi avec une portée éminemment pratique.

3.1 La présentation du projet

C'est dans la zone de convergence et de rencontre des quatre systèmes de l'enseignement que l'étude des différences individuelles, définies sous formes d'habiletés perceptuelles différentes, d'habiletés mentales différentes, d'habiletés mnémoniques différentes et d'attitudes sociales différentes, prend toute sa signification et son importance. Ces différences, conjuguées ensemble, donne le style d'apprentissage d'un individu.

Ce style, une fois déterminé, permet d'avoir des indications précises sur la fréquence[7] et sur l'incidence[8] de la conjonction de l'acte d'enseigner et de l'acte d'apprendre dans la zone commune aux quatre systèmes en interrelation.

Le projet de détermination du style d'apprentissage poursuit deux objectifs:

1. trouver une réponse pertinente à une question précise qui se pose avec l'implantation d'un système d'enseignement individualisé et personnalisé au Cégep André-Laurendeau;
2. répondre à des besoins nouveaux qui font suite à cette implantation.

Par ailleurs, ce projet s'inscrit dans la suite des recherches sur la relation entre les habiletés individuelles de l'enseigné et la conjonction de l'acte d'enseigner et de celui d'apprendre dans une situation d'apprentissage. Il apparaît, semble-t-il, avec une portée pratique pour tous les niveaux du système d'enseignement actuel[9].

3.1.1 Une réponse pertinente à une question précise

Le projet de détermination du style d'apprentissage veut trouver une réponse pertinente à une question précise. En effet, pour un enseigné, est-il important, ou encore nécessaire de connaître et d'utiliser ses habiletés individuelles définies sous formes d'habiletés perceptuelles, d'habiletés mentales, d'habiletés mnémoniques et d'attitudes sociales en vue d'une réussite scolaire maximale dans un système d'enseignement individualisé et personnalisé[10].

Un système d'enseignement individualisé et personnalisé, par définition même, s'oppose à tout système d'enseignement non-individualisé, dépersonnalisé ou non. En effet, le système d'enseignement individualisé et personnalisé est fonction des différences individuelles des enseignés. Ces différences, comme il a déjà été dit, fondent l'incidence et la fréquence de la conjonction de l'acte d'enseigner et l'acte d'apprendre

dans la zone commune aux quatre systèmes: enseignable, enseignage, enseignant et enseigné.

Par contre dans un système d'enseignement non-individualisé, mais pas forcément dépersonnalisé, comme le système d'enseignement traditionnel, à la fois collectif, magistral et livresque, le panorama des habiletés individuelles (telles que définies antérieurement) ne reçoit pas le même crédit. En effet, il y a rétrécissement de ce panorama par une régression vers une moyenne d'habiletés individuelles. Le système d'enseignement devient alors fonction d'un enseigné moyen caractérisé par une moyenne d'habiletés spécifiques préalablement et plutôt arbitrairement sélectionnées dans le panorama des habiletés spécifiques propres à l'univers enseigné[11].

Le système d'enseignement traditionnel est donc fonction d'un enseigné qui se situe dans la moyenne et qui répond à une moyenne d'habiletés spécifiques. Ainsi ce système favorise certains enseignés au détriment d'autres, compte tenu de certaines habiletés spécifiques, retenues comme essentielles pour la conjonction de tout acte d'enseigner et de tout acte d'apprendre. Ce système tient donc pour acquis non seulement qu'un certain nombre d'enseignés peut assimiler l'enseignable, mais encore que cette proportion décroît avec le niveau d'abstraction de l'enseignable à assimiler.

Le système d'enseignement individualisé et personnalisé repose sur le postulat que tout acte d'enseigner peut se conjuguer avec un acte d'apprendre quand l'enseignable, grâce à l'enseignage, fait appel aux habiletés spécifiques d'un individu. Ainsi le pourcentage de réussite scolaire n'est plus fonction d'une moyenne ou du niveau d'abstraction et/ou de concrétion de l'enseignable, mais de la mise en oeuvre des habiletés spécifiques dans la zone commune aux quatre systèmes de l'enseignement.

Il importe donc de se pencher sérieusement sur la question des différences individuelles dans un système d'enseignement individualisé et personnalisé.

3.1.2 Les besoins nouveaux

Le Cegep André-Laurendeau, selon ses devis pédagogiques, est susceptible de s'orienter vers la personnalisation et l'individualisation de l'enseignement.

Le projet de détermination du style d'apprentissage mis sur pied par le Service de psychologie et d'orientation, se propose de répondre aux besoins nouveaux qui surgiront suite à l'implantation progressive d'un système d'enseignement individualisé et personnalisé. Deux types de besoins nouveaux méritent d'être retenus:

1. les besoins des enseignants du Cegep André-Laurendeau de connaître le style d'apprentissage de leurs enseignés afin de s'y adapter et de leur prescrire les tâches d'apprentissage qui leur conviennent le mieux;
2. les besoins des futurs enseignés du Cegep André-Laurendeau de connaître leur style d'apprentissage afin de s'adapter adéquatement aux divers enseignages disponibles et d'être à même de comprendre la signification concrète de leur prescription d'apprentissage.

C'est pourquoi le système d'enseignement individualisé et personnalisé du Cegep André-Laurendeau, dans sa réalisation concrète, sera en partie le fruit du travail des enseignants qui structureront les systèmes enseignable et enseignage à partir d'une connaissance approfondie des habiletés individuelles de l'enseigné en se référant, ou non, au cadre conceptuel des Sciences pédagogiques. C'est seulement une fois conscients du panorama des habiletés spécifiques de l'enseigné et de leur signification concrète que les enseignants pourront analyser, structurer et programmer, indépendamment et conjointement, les systèmes enseignable et enseignage.

Par ailleurs, les futurs enseignés du Cegep André-Laurendeau devront être progressivement préparés à passer d'un système d'enseignement qui repose sur la moyenne d'une moyenne d'habiletés à un système qui repose

sur les différentes habiletés spécifiques de l'enseigné[12]. Sans quoi, les futurs enseignés risquent d'être complètement perdus, ne voyant plus comment réaliser la conjonction de l'acte d'enseigner et de l'acte d'apprendre, la possibilité de cette conjonction s'étant de beaucoup accrue.

La détermination du style d'apprentissage de chaque étudiant sera assumée par le Service de psychologie et d'orientation[13]. La prescription d'apprentissage pourra être établie par ce même Service, ou par les enseignants, ou encore en collaboration.

3.2 La portée du projet

Le projet de détermination du style d'apprentissage a une portée théorique et une portée pratique.

3.2.1 La portée théorique

Le projet de détermination du style d'apprentissage fera naître, éventuellement, plusieurs recherches théoriques et expérimentales sur les différences individuelles telles que définies à partir du cadre conceptuel des Sciences pédagogiques, sur les styles collectifs d'apprentissage propres aux diverses orientations professionnelles, sur les divers niveaux de lecture (compréhension et vitesse) et la réussite scolaire dans un programme de cours généraux et/ou professionnels, sur les diverses prescriptions d'apprentissage et le succès scolaire, sur l'appariement du style d'apprentissage de l'enseigné avec celui de l'enseignant, etc. Il serait possible d'allonger cette liste de recherches à effectuer. La pierre d'acchoppement pour la réalisation de celles-ci semble se situer beaucoup plus du côté des ressources humaines à engager plutôt que du côté des ressources financières à investir. En effet, la recherche dans un secteur aussi ancien et aussi nouveau à la fois que les différences individuelles exige un engagement total et persévérant des enseignants, des enseignés et des professionnels de la recherche, de la mesure et de l'évaluation, à plus forte raison quand ceux-ci doivent oeuvrer dans un système d'enseignement

individualisé et personnalisé.

Le présent projet cherche donc à susciter la recherche sur l'apprentissage et les différences individuelles au niveau élémentaire, secondaire, collégial et universitaire. En effet, la réussite scolaire maximale est une préoccupation de tous les niveaux de l'enseignement: elle a des implications économiques, sociales, culturelles, professionnelles et psychologiques qui ne peuvent être ignorées par ceux qui sont engagés, d'une manière ou d'une autre, dans le système enseignement.

Ainsi la recherche sur les différences individuelles, variables indépendantes les plus importantes dans un système d'enseignement individualisé et personnalisé, est susceptible d'alimenter et de susciter la recherche théorique et expérimentale à tous les niveaux du système enseignement. Elle permettra de mieux mesurer et de mieux évaluer les implications théoriques et concrètes de la conjonction de l'acte d'enseigner et de l'acte d'apprendre dans la mise en interaction des quatre systèmes en cause. Ce projet est donc appelé à rayonner à l'intérieur du collège comme à l'extérieur.

3.2.2 La portée pratique

Le projet de détermination du style d'apprentissage aura une portée pratique pour les enseignants et les enseignés du collège.

Les enseignants ont tout avantage à connaître le plus possible leurs enseignés et tout spécialement ceux qui s'adonnent à l'enseignement individualisé ou personnalisé, ou tout au moins à certains de ses aspects. En effet, le projet de détermination du style d'apprentissage permettra d'obtenir un psychodiagnostic judicieux sur les différentes habiletés et attitudes de chacun des enseignés du collège[14].

Par ailleurs, il est extrêmement intéressant de constater que ce projet se présente comme pouvant combler une lacune du projet d'apprentissage individualisé en biologie 921 et 931 mis sur pied par le Cegep Édouard-Montpetit qui s'est adjoint, par la suite, la participation des collèges Rosemont, St-Jean-sur-le-Richelieu et André-Laurendeau. Monsieur René Lachaîne, promoteur de ce projet d'apprentissage du Cégep André-Laurendeau, est d'avis que le profil d'apprentissage de chacun des étudiants inscrits à ses cours lui serait d'une grande utilité dans son travail avec ceux-ci.

Bien plus, une connaissance approfondie des enseignés permettrait aux enseignants d'exploiter utilement des affinités dans la structuration des groupes de travail pour les différentes formes de séminaire possibles, pour les répétitions entre étudiants, etc.

Le style d'apprentissage de l'étudiant sera également utile pour la détermination de la prescription d'apprentissage individualisé et personnalisé de chaque étudiant que les enseignants, semble-t-il, seront appelés à assumer de plus en plus. Avec le graphe d'apprentissage, ce travail n'en sera que plus efficace et plus expéditif.

Ainsi le projet de détermination du style d'apprentissage se veut au service des enseignants pour faciliter et peut-être rendre plus efficace encore leur action pédagogique dans la conjonction de l'enseignable et de l'enseignage.

Les enseignés, de leur côté, disposeront de leur profil d'apprentissage et, par le fait même, auront des indications précises sur leur manière de dégager du sens de leur entourage. En effet, le graphe d'apprentissage leur fournira une vue d'ensemble des différents éléments qui interviennent soit prioritairement, soit accessoirement ou n'interviennent pas dans leur adaptation à leur milieu ambiant.

Ces informations leur fourniront une occasion de se mieux connaître et, par voie de conséquence, de se mieux situer face à eux-mêmes, face à leurscollègues, face à leurs enseignants, face aux différents enseignables et face aux différents enseignements. En d'autres mots, la compréhension de leur profil d'apprentissage est de nature à leur permettre de comprendre la pertinence de la prescription d'apprendre qui leur sera suggérée par l'enseignant et/ou le professionnel de la mesure et de l'évaluation. Une telle compréhension les mettra à même de réajuster spontanément leur prescription d'apprentissage ou de faire appel aux personnes compétentes et pertinentes à cet effet.

Par voie de conséquence, il est à prévoir que les enseignés, se connaissant mieux, pourraient s'engager avec plus de motivation dans le processus de réalisation de leur programme de cours, plus rassurés sur le résultat final de leurs efforts. Cet engagement pourrait être à la base de la mise en branle d'un processus de conditionnement intégratif et positif d'eux-mêmes dans une démarche méthodique vers le succès.

Ainsi les enseignants et les enseignés bénéficieront de toutes les indications que fournira le profil d'apprentissage individuel et des mesures qu'il suggérera par la suite.

4.0 CONCLUSION

Ainsi le Cegep André-Laurendeau, selon ses devis pédagogiques, est susceptible de s'orienter vers la personnalisation et l'individualisation de l'enseignement. Le style d'apprentissage est apparu comme une mesure favorisant la réalisation de ces deux objectifs. C'est pourquoi le projet de détermination du style d'apprentissage a été mis sur pied.

Ce projet est actuellement en bonne voie de réalisation localement et de rayonnement à l'extérieur du collège. Il permettra, d'une part, de déterminer le style d'apprentissage de chaque étudiant et, d'autre part, d'établir la prescription d'apprentissage qui lui convient.

Il est prématuré de se prononcer dès maintenant sur toutes les conclusions et toutes les implications du projet de détermination du style d'apprentissage au Cegep André-Laurendeau. Néanmoins, les expériences américaines invitent à un certain optimisme. C'est dans cette perspective que sont attendus les résultats de ce projet.

ANNOTATIONS

[1]Ce texte n'engage que son auteur.

[2]L'apprentissage est individualisé quand il est fonction des différences individuelles de l'enseigné et il est personnalisé quand il favorise l'épanouissement de sa liberté de choix et de son sens des responsabilités.

[3]Nous empruntons cette conception à James B. MacDonald, Educational Models for Instruction-Introduction, in Theories of Instruction, Washington: Association for Supervisor and Curriculum Development, 1965, pp. 1-7. La figure 1 ci-après concrétise cette définition de l'enseignement.

[4]Nous renvoyons à la figure 1.

[5]La plupart de ces recherches ont été recensées et catégorisées dans le document suivant: James J. Berry and Thomas Sutton, The Educational Sciences A Bibliography with Commentary, Royal Oak (Michigan): American Educational Sciences Association, 1973. Cette bibliographie est disponible pour la somme de $4.00 en commandant directement: AESA, 1300, rue Grove, Royal Oak, Michigan 48067.

[6]Le terme "sens" est employé ici comme synonyme de signification et non pas comme synonyme d'organe sensoriel, ou d'orientation.

[7]La fréquence concerne l'acquis, soit le nombre d'actes répétés.

[8]L'incidence concerne ce qui est à acquérir, soit le nombre d'actes nouveaux.

[9]Il y aurait lieu de signaler le Teacher Improvement Project, mis sur pied au niveau élémentaire par Barbara Bowman à East Lansing Public Schools, Michigan.

[10]Un système d'enseignement individualisé et personnalisé ne doit pas s'entendre matériellement dans le sens de l'autodidaxie. Ceux qui consomment solitairement le savoir selon un même menu ne bénéficient pas d'un enseignement individualisé tel qu'il est entendu ici. En régime d'individualisation proprement dit on consomme le savoir à la carte et en régime de personnalisation proprement dit on le consomme en bonne compagnie.

[11]Il s'agit ici, théoriquement, de l'ensemble des enseignés humains.

[12]L'enseignement traditionnel s'adresse habituellement à la moyenne d'une distrubution normale d'enseignés. Néanmoins, il ne tient pas compte du panorama complet de leurs différentes habiletés, mais d'une moyenne de celles-ci.

[13]Il n'est pas apparu pertinent dans le présent document de décrire le matériel de testage qui sera utilisé pour la détermination du style d'apprentissage; la description de ce matériel pourra faire l'objet d'une publication ultérieure.

[14]Le psychodiagnostic pourrait être facultatif pour les étudiants ou bien être une étape normale entre l'admission et l'inscription.

CONTRIBUTIONS OF EDUCATIONAL COGNITIVE STYLE ANALYSIS TO BILINGUAL INSTRUCTION

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Bilingual Education in Canada

The educational reform movement known as "bilingual education" has made modest advances since the publication of the preliminary report of the Royal Commission on Bilingualism and Biculturalism (1967). This Commission, charged with the responsibility of studying the thorny language question in Canada, has produced and elicited numerous briefs by representatives of the two official languages — English and French — as well as by different linguistic minorities, including Italians, Poles and Ukranians (see reference list for books published to date).

As a result of the policies recommended in these books and the increased emphasis on bilingualism in Canada in recent years, a number of innovative educational programs have evolved using the second language as the language of instruction for all or part of the curriculum. The majority of these programs have been modelled after the study initiated in St. Lambert, on the outskirts of Montreal in 1965 (Lambert and Macnamara, 1969; Lambert and Tucker, 1972; Lambert, Tucker and d'Anglejan, 1973; Bruck, Lambert and Tucker, 1964).

In the St. Lambert experiment, English-speaking children attending an English school were taught entirely in French throughout Kindergarten and Grade 1, with English being introduced in limited amounts in Grade 2 and gradually increased in later grades, until a relative balance of French and English instruction was attained. According to the seventh annual report (Bruck et al., 1974, p. 183), the children in bilingual classes showed that this form of education, i.e. "immersion" or the "home-school language switch" approach, has had no detrimental effects on their academic, linguistic or cognitive functioning. Furthermore, the authors report that the pupils, who are now in the seventh grade, can communicate effectively in their second language with French Canadian age-mates. This "immersion" variety of bilingual instruction has been adopted with minor modifications at varying grade levels in several other localities (Swain, 1974). Although the evaluations of these bilingual approaches are positive, definite problems remain.

A New Approach Needed

Despite the positive advances in teaching children in two languages — the child's mother tongue and a second language — complex issues continue to surface. Some of these serious concerns can be mentioned briefly in this paper. They pertain to the use of the term "bilingual school," the conceptual outlook of bilingual education, and some current practices in bilingual instruction.

The Royal Commission (Book II. Education, 1970, p. 73-74) referred to the confusing variety of educational patterns for French-speaking minorities resulting from the use of the term "bilingual schools." The Commission pointed out that in English-speaking provinces the term is applied to provincial schools in which the students are French-speaking, thereby suggesting that both English and French are normal languages of instruction. However, this may not be the case at all. English may be the sole language of instruction, with French being taught as a subject, or French may be the sole language of instruction with English being employed only to teach English as a course of studies. Realizing this situation, the Royal Commission concluded:

> Not only is the term vague, but it may also be misleading because it is often assumed that there is a uniform language pattern within "bilingual schools."

The Commission proposed to substitute the term "minority-language schools". In addition to the vagueness associated with the term "bilingual school", a coherent rationale for "minority-language" instruction is lacking.

The principle that Anglophone and Francophone children should have the right to be educated in their own language became Ontario law on May 30, 1968 (Legislature of Ontario, Debates, May 30, 1968, 3638-42, reported in Book II, Education, p. 75). However, in agreeing strongly with this principle and acclaiming it as a "significant forward step," the Commission cautioned that the legal recognition of French as a language of instruction will not guarantee an adequate system of education for the Francophone minority outside Quebec. It

cited the "embryonic" nature of education for minority-language groups and the need for continued careful planning as reasons for its cautious tone. In other words, a coherent conceptual framework for education of minority-language groups is lacking.

Lieberson (1970, p.78), in reviewing current Canadian education, concluded that there was a wide range of practices ranging from almost total support for native French speakers in education and employment to minimal support.

Illustrations of current practices in "bilingual schools" are contained in the report of the Commission (Book II, p.76-79). It reported the following practices occurring in Ontario:

1. Lack of a carefully developed course of study for teaching English to French-speaking children;
2. In spite of the use of English texts and written examinations in English, the teacher often finds the problems are better understood by French-speaking children if explanations are given in French;
3. By Grade VII, children may be taught every subject except French in English or, at the other extreme, they may be taught every subject except English in French.

These are only a few of the instructional practices that hopefully the new legislation will change in the years ahead. Nevertheless, a new approach is needed to guide the efforts of minority-language groups in the future.

To meet the serious implications of the Royal Commission reports and the need for a new approach within bilingual education at least in part, this paper will attempt to:

1. identify a conceptual framework for education that educators and practitioners may find helpful in their professional efforts;
2. illustrate the technique of "cognitive style mapping;"
3. suggest assessment approaches through an outline description of the author's own research;

4. List some contributions of educational cognitive style analysis for minority-language instruction.

Although not offered as a panacea for the ills that beset contemporary education, the Educational Sciences can contribute significantly towards their resolution.

The Educational Sciences as a Framework

A conceptual framework that could serve to foster the educational success of bilingual individuals can be identified in the Educational Sciences. Hill (1973) states that the Educational Sciences provide a "conceptual and scientific language for the applied fields of education", thereby making possible the articulation of phenomena and problems related to education. This conceptual framework attempts to reduce misconceptions among educators that result from a lack of communication. It seeks to bring increased accuracy to the resolution of educational problems including those of special relevance to education of minority-language groups (Baecher, 1973).

Essential to these "sciences" are the following assumptions:

1. Education is the process of searching for meaning.
2. Thought is different from language.
3. Man is a social creature with a unique capacity for deriving meaning from his environment and personal experiences through the creation and use of symbols.
4. Not content with biological satisfactions alone, man continually seeks meaning.

(Hill, 1973).

These four assumptions are primary considerations in focusing upon the strengths of the bilingual child. They complement the assumptions of bilingual instruction insofar as the language and cultural characteristics of learner are significant factors to be considered seriously in his educational development. Moreover, these assumptions are essential to understanding the "cognitive style" of these pupils.

Educational Cognitive Style

A bilingual individual's educational cognitive style is a description of the way he seeks meaning from the formalized structures of knowledge. In determining the educational cognitive style of a bilingual student, these questions become paramount:

1. How does he or she perceive his surroundings?
2. What symbols does the individual prefer to use in solving problems?
3. Is the bilingual pupil characteristically a listener or a reader?
4. Is the individual more capable and comfortable learning concepts in his mother tongue?
5. Does the individual make up his own mind or seek consensus with peers?
6. Does he reason in categories, like a mathematician, or in relationships as a social scientist might?

These are only a few of the important questions that are asked in observing how the bilingual child acquires knowledge, that is, his educational cognitive style. The style of an individual encompasses numerous elements (forming profiles) which have been defined by Hill (1964) and used as the basic structures of the first five Educational Sciences. These sciences are:

1. symbols and their meanings;
2. cultural determinants of the meanings of symbols;
3. modalities of inference;
4. educational memory; and
5. the cognitive style of the individual.

It should be noted that the fifth Educational Science of Cognitive Style includes the first four sciences. Also, "educational memory" — the fourth Educational Science — will not be described in this paper because of its speculative nature. The reader is referred to a discussion of educational memory in Hill (1975).

The numerous elements that form an individual's cognitive style are displayed in a cognitive style "map". This map, or picture of the variety of profiles students use in their pursuit of education, results from the process called "cognitive style mapping".

Cognitive Style Mapping

Using cognitive style mapping, teachers can determine which pupils can and do learn well from TV or programmed instruction or group work, for example. A student's educational cognitive style map identifies the strengths, or unique ways in which that bilingual pupil can master an educational task most readily.

Through the observations and questioning that form the basis for professional judgments about an individual's cognitive style, teachers can discover how the student uses symbols to solve problems, how he is affected by these symbols in cultural contexts, and how he categorizes, contrasts and relates information.

The individual's map is composed of three principal areas that are explored by the teacher through continuous questioning and observations:

The first area of exploration is Symbols And Their Meanings. The teacher, trained in observing and formulating behavorial descriptions, looks for indications of the bilingual pupil's use of symbols. The teacher may discover, for example, that the child is more successful in listening tasks in French, or that reading activities in English provide greater success. The teacher's attention may be drawn to the fact that the student excels in the use of mathematical symbols and numerical relationships. Moreover, the teacher may determine the degree to which the pupil, depends on his sense of hearing and touch in acquiring knowledge, empathizes with others in the same group or class, and accurately assesses his limitations in various educational tasks. These elements, or symbols, provide clues to the strengths to be found in bilingual pupils. They are indicators of the ways of seeking meaning, as well as the feelings, commitments and values of the bilingual child. The reader is encouraged to investigate the bibliography for more information about Symbols And Their Meanings, and the

section entitled "A Brief Guide to Cognitive Style Mapping".

Cultural Determinants, the second area of exploration, guides the teacher in ascertaining the influence of social groups on bilingual children's perception of their role in life situations. Peers or associates may contribute significantly to the way in which children view the world. Family members provide behavioral standards and guidelines from infancy to well into the school years. The teacher may note that the individuality of the students has a strong influence on their actions. The students' awareness of the factors that make them different from other pupils, and the way the students look upon these differences, either positively or negatively, determine both their behavior and the ways in which they assign meanings to symbols. Cultural Determinants then, can offer the teacher of bilingual children a profound insight into their world of human relationships.

The third area, Modalities of Inference, refers to the processes by which the student reaches decisions, i.e., his method of thinking. The teacher may observe that some bilingual children are quick to place items into classes or categories, and to use rules and norms in determining courses of action. Other students may have different reasoning patterns; they may tend to compare things on the basis of a single characteristic. Still others may look for multiple relationships in what they perceive. Some children combine all these methods of thinking to arrive at conclusions. A few pupils use the deductive reasoning method of the mathematician in making decisions.

Cognitive mapping therefore, entails the use of a common language, and a variety of questioning and observational techniques. The common language that describes these three areas in mapping takes the form of an algebraic-visual short-hand.

For example, bilingual student number one (taken from Baecher, 1973), a fourth grader reading below grade level in English and Spanish, is a proficient listener. He is successful with materials requiring listening in English and Spanish. The numbers above each set of notations, T(AL) - T(VL), indicate his present "developmental" level of education at the time he was mapped.

Fourth Grade Student

2.7 READING GRADE LEVEL (English)

2.7 READING GRADE LEVEL (Spanish)

$$\left\{ \begin{array}{l} {}^{5}T(AL)_{e} \quad {}^{3}/T(VL)_{e} \\ {}^{4}T(AL)_{s} \quad {}^{2}T(VL)_{s} \\ \\ Q(CEM)_{e} \\ Q(CES)_{e} \\ Q(CET)_{e} \end{array} \right\} X \left\{ I \quad F/ \right\} X \left\{ M \quad D/ \right\}$$

IN WRITING IT WOULD LOOK LIKE THIS

[Processes more information from listening than from printed materials, in both English and Spanish...

Is able to identify with another person's role...

Can appreciate "beauty" of ideas and things....

Dedicated to a set of rules and principles. Works hard at assignments...]

[Is an individualist. Makes up his own mind.

Will take directions from an authority figure.]

[Categorizes and classifies things and events.....

Compares and contrasts on a one-to-one basis. Perceives many differences.....]

BILINGUAL STUDENT NUMBER ONE

The subscripts e and s refer to the English and Spanish forms of tests used to determine the symbolic orientation of the bilingual pupil. Moreover, this bilingual student empathizes with others., appreciates the "beauty" discovered in scenes and music, and is dedicated to a set of principles. He is an individualist, and reaches decisions through a form of categorical reasoning.

Bilingual student number two, a fourth grader reading above grade level in English and Spanish, is a reader. He is influenced by his peers, derives meaning from visual materials, and perceives multiple relationships among things and events. His map is shown below.

Fourth Grade Student

5.8 READING GRADE LEVEL (English)
5.3 READING GRADE LEVEL (Spanish)

$$\left\{ \begin{array}{ll} 3 & / 4 \\ T(AL)_e & T(VL)_e \\ 4 & 5 \\ T(AL)_s & T(VL)_s \\ & \\ Q(CKH)_s & \\ Q(V)_s & \end{array} \right\} X \left\{ \begin{array}{l} A \\ I/ \end{array} \right\} X \left\{ \begin{array}{ll} R & L \end{array} \right\}$$

IN WRITING IT WOULD LOOK LIKE THIS:

[Gets more meaning from written materials, English or Spanish, than from verbal directions...

Derives meaning from visual clues and pictures..

Manifests ability to perform motor tasks very well...]

[Influenced by his associates or peers ...

Sometimes can work independently...]

[Sees relationships among things and qualities...: likes many examples and illustrations in educational tasks...

Makes decisions after carefully considering all available information...]

BILINGUAL STUDENT NUMBER TWO

A cognitive style map, then, in addition to identifying the ways in which a student can be most successful in mastering an educational task, can provide the self knowledge essential to developing realistic educational goals. Cognitive style is not static; it represents a dynamic and growing search for meaning on the part of the bilingual student.

Each map like each student, is different, and therefore requires a personalized educational program which can be augmented. Missing strengths required can be built on a student's existing strengths. The map is a starting point from which the teacher initiates a "prescription", i.e., develops a personalized educational program geared to the bilingual student's strengths and weaknesses.

Educational Prescriptions

To promote the educational success of bilingual student number one, the teacher might prescribe the use of audio-tapes to take advantage of this student's listening strength. These tapes and records could be in Spanish or English. He could receive his directions verbally and could work individually in a carrel with programmed materials. Instructions should be given in short, easy steps. Activities incorporating music and other related features could be planned. The teacher might augment his reading skills by means of these general prescriptions, or by working through these strengths and other cognitive style elements that the teacher judges to be relevant (Radike, 1973; Bowman et al., 1974). Other activities might include: (1) modality selection, whereby this bilingual pupil selects his own way of learning, in this case listening, and (2) choosing from alternatives such as contract teaching.

For bilingual student number two, the teacher would prescribe written materials and give directions in writing. These materials could be in English or Spanish, and emphasis should be placed upon the use of visuals in helping this pupil. Since he works well with his peers, the teacher might provide peer teaching learning situations. Activities using his motoric abilities might be planned in an integrated manner with reading materials. Educational tasks that require sorting

and classifying might increase his ability in categorical thinking. Examples of other activities are open grouping for reading, peer instruction, and modality selection emphasizing the use of visuals.

These are only a few of the numerous educational prescriptions that the teacher can derive from these maps. Each teacher can begin to "match" the cognitive style of the bilingual student with available classroom resources, thereby personalizing education for successful completion of educational tasks. This focus on bilingual children's strengths results from applying instruments and techniques that teachers can use in assessing the cognitive styles of their bilingual students.

Educational Assessment of Bilingual Children

"Educational assessment," refers to the process of determining systematically the presence or absence of cognitive style elements in the bilingual student. This process involves the human judgments and decision-making of teachers, based on a variety of observations and other forms of information receiving. Various instruments and techniques can be used to assess bilingual children. Only a brief outline description of the author's own research, and those of The Educational Sciences (Berry and Sutton 1973) can be given in an article of this nature.

With respect to Symbols And Their Meanings, especially theoretical symbols, and that knowledge acquired through oral and written symbols, these instruments can be used:

1. Tests of basic skills in English and Spanish;
2. Reading tests—Spanish and English versions;
3. Mathematics tests—Spanish and English forms; and
4. Judgment of competent teachers.

Non-linguistic or "qualitative" symbols, e.g., picture clues and kinesics, can be determined through direct measures and/or observations of sensory, programmatic and "cultural codes " (the reader should refer to Dr. Hill's article for more information).

The author's own research has employed, adapted and modified standardized tests, in both English and Spanish, to investigate the listening and reading capabilities of bilingual students of Chicano and Puerto Rican background. Similar work has been done concerning the mathematical abilities of bilingual pupils. Provided with a conceptual outlook and a common language, teachers can avail themselves of various instruments to probe selected cognitive style elements.

With respect to Cultural Determinants, observations of the effect of social groups on the meanings students assign to symbols are made. For instance, does the student talk about his family often? Would he rather work alone or in a group? Answers to these questions will indicate those cultural influences that are brought to bear upon the individual in the form of family and associates?

Concerning Modalities of Inference, illustrations of aspects to note are: (1) does the student often use words such as, "It's just like..., It's the same as..., But what if..." (2) how neat and organized is his work? and (3) does the pupil deliberate in his thinking?

Numerous other techniques, such as self-assessment reports and interviews, can be used to focus on the strengths of the bilingual child. Essential to the process described here is that teachers begin to communicate about the cognitive styles of their bilingual pupils and make humane, professional decisions that are sensitive to these students' educational needs.

Conclusions

This final section summarizes some important contributions of cognitive style analysis for minority-language instruction. Not to be interpreted as a panacea for all educational problems, educational cognitive style does offer fresh insight and positive directions for minority-language education personnel. These contributions will take the form of a list relating the Educational Sciences to bilingual education.

Bilingual Education	Educational Sciences
1. Sorely needs a conceptual outlook and a common language for administrators and teachers to use in communicating about their bilingual students.	1. Offers a coherent and dynamic conceptual framework. Takes into account the symbolic orientations, cultural influences, modalities of inferences and educational memory of the bilingual pupil.
2. Ranges from a "compensatory" to an "enrichment" status for its rationale, thereby representing a fractionated reform movement in education.	2. Views the bilingual student as one who is "acquiring knowledge" continually, thereby representing a "difference" theory of unique strengths to which the educational system must adapt.
3. Obsessively concerned with the bilingual child's linguistic performance and knowledge of "theoretical symbols" in educational programs; continues to label such students and to fit them to categorical type programs.	3. Concerned with the "total" bilingual child; focuses on the strengths of this individual, in order to develop a "personalized" educational program.
4. Lacks agreed upon assessment procedures that are relevant and sensitive to instructional needs of the student.	4. Provides practitioners a direction; invites them to discover ways in which bilingual pupils acquire knowledge; emphasizes the important role of the competent teacher's professional judgments.

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L'ANALYSE DES STYLES D'APPRENTISSAGE ET L'INSTRUCTION BILINGUE

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L'éducation bilingue au Canada

Le mouvement de réforme pédagogique appelé "enseignement bilingue" a progressé, modestement, depuis la publication du rapport préliminaire de la Commission royale d'enquête sur le bilinguisme et le biculturalisme (1967). Chargée d'étudier l'épineuse question linguistique, la Commission a publié quantité de mémoires préparés par des groupes représentant les deux communautés linguistiques officielles - anglophone et francophone - et diverses autres ethnies, dont les Italiens, les Polonais et les Ukrainiens. (Les volumes du rapport déjà publiés apparaissent dans la bibliographie).

A la suite des recommandations des commissaires et vu l'extension toujours plus grande du bilinguisme au Canada, on a vu démarrer quantité de nouveaux programmes d'étude utilisant la langue seconde comme langue d'enseignement à temps plein ou partiel. Ces programmes ont, pour la plupart, été conçus sur le modèle du projet pilote lancé à Saint-Lambert, en banlieue de Montréal, en 1965. (Lambert et Macnamara, 1969; Lambert et Tucker, 1972; Lambert, Tucker et d'Anglejan, 1973; Bruck, Lambert et Tucker, 1964).

Dans l'expérience de Saint-Lambert, de jeunes anglophones inscrits à l'école anglaise ont fait toute leur année de maternelle et leur première année en français; à partir de la deuxième année, on a commencé à recourir à l'anglais, d'abord à faibles doses et progressivement davantage jusqu'à ce qu'un certain équilibre soit atteint entre les deux langues. Le septième rapport annuel (Bruck et al, 1974, p. 183) affirme que les enfants des classes bilingues n'ont pas souffert, dans leurs réalisations scolaires, linguistiques ou cognitives, de l'immersion dans la langue seconde ou le changement de langue entre l'école et le foyer n'a pas affecté l'apprentissage scolaire et linguistique. Les auteurs signalent de plus que ces élèves, une fois en septième année, communiquent aisément en français avec leurs compagnons francophones. Cette variante de la technique de l'immersion a été mise à l'essai dans plusieurs autres localités, chacune l'adaptant à ses besoins propres en fonction des niveaux d'études concernés (Swain, 1974). Le succès de ces tentatives n'est cependant pas total et les difficultés demeurent nombreuses.

Nécessité d'une nouvelle approche

Malgré les progrès accomplis dans l'enseignement dans les deux langues au niveau élémentaire - langue maternelle et langue seconde -, des problèmes complexes ne cessent de surgir. Nous ne ferons ici qu'en examiner brièvement les plus pressants, à commencer par les difficultés que suscite l'emploi de l'expression "école bilingue", l'orientation conceptuelle de l'enseignement bilingue et de quelques pratiques courantes qui la caractérisent.

La Commission royale souligne (volume II, L'Education, 1970, pp. 73-74), la diversité embarrassante des modèles d'éducation que coiffe l'expression "école bilingue" pour les minorités françaises. Elle fait remarquer que, dans les provinces anglophones, on désigne ainsi les écoles publiques dont les élèves sont francophones, ce qui laisse entendre que l'anglais et le français sont, l'un et l'autre, des langues courantes d'enseignement. Or, c'est peut-être loin d'être le cas. L'anglais peut être la seule langue d'enseignement, le français ne constituant qu'une discipline parmi d'autres, ou vice versa. Aussi les commissaires concluent-ils:

> L'expression n'est donc pas qu'imprécise, elle peut être également ambiguë car elle porte à croire que l'enseignement obéit à un modèle uniforme dans toutes les écoles "bilingues".

Ils proposent de lui substituer à l'avenir l'expression "école de la minorité linguistique". L'ambiguïté relevée se double d'une absence d'orientation théorique cohérente pour l'enseignement de la "langue de la minorité".

Le principe suivant lequel les parents, anglophones ou francophones, devraient pouvoir faire instruire leurs enfants dans leur langue a pris force de loi le 30 mai 1968 (Journal des débats de l'assemblée législative d'Ontario, 30 mai 1968, pp. 3638, cité dans le deuxième volume sur l'éducation, du rapport de la commission, p. 75). Si les commissaires reconnaissent qu'il s'agit là d'un "progrès digne de mention"

ils tiennent quand même à rappeler que la reconnaissance juridique du français à l'école ne garantit pas à la minorité francophone un système scolaire adéquat. Ils soulignent le caractère "embryonnaire" de l'enseignement de la langue de la minorité et la nécessité de planifier soigneusement toute avance dans ce domaine. En d'autres termes, il manque un cadre conceptuel cohérent pour l'enseignement aux minorités linguistiques.

Lieberson (1970, p. 78), dans l'analyse qu'il fait de l'enseignement au Canada, conclut à la grande diversité des méthodes d'enseignement au pays, certaines provinces appuyant presque au maximum l'élément francophone indigène, d'autres le desservant très nettement en restreignant l'emploi du français et en faisant de l'anglais la langue d'enseignement.

Le rapport de la Commission donne quelques exemples des pratiques d'enseignement dans les "écoles bilingues" de l'Ontario (volume II, pp. 76-79):

1. Il n'y a pas de programmes d'enseignement de l'anglais spécialement conçus pour les francophones;
2. Même si les manuels sont en anglais et que les examens se passent en anglais, le professeur est souvent obligé de donner ses explications en français s'il veut être compris;
3. A partir de la septième année, tous les cours, sauf le français, peuvent être donnés en anglais ou, à l'inverse, tous les cours en français sauf l'anglais.

Ce ne sont là que quelques-unes des pratiques que la nouvelle loi espère corriger dans les années qui viennent. La nécessité de réorienter complètement l'enseignement des langues de la minorité n'en demeure pas moins très réelle.

Pour combler partiellement les lacunes sérieuses mises en lumière par la Commission royale et apporter une nouvelle approche des méthodes d'enseignement de la langue seconde, nous nous proposons, dans les pages qui suivent, (1) d'exposer un nouveau cadre conceptuel de l'éducation dont les éducateurs et les praticiens pourront s'inspirer dans l'exercice de leur profession; (2) d'illustrer la technique des "graphes d'apprentissage"; (3) de présenter des méthodes d'appréciation mises au point par

l'auteur à la suite de recherches personnelles, et (4) de souligner les avantages que présente l'analyse des modes d'apprentissage pour l'enseignement de la langue de la minorité. Sans prétendre être une panacée pour tous les maux actuels de l'enseignement, les sciences pédagogiques peuvent quand même contribuer efficacement à leur soulagement.

Le cadre des sciences pédagogiques

Les sciences pédagogiques s'inspirent d'une pensée qui inscrit le succès scolaire des sujets bilingues dans le cadre général de toute leur éducation. Hill (1973) affirme qu'elles fournissent un cadre conceptuel et un langage scientifique aux domaines appliqués de l'éducation, ce qui permet d'articuler les uns aux autres les phénomènes et les problèmes pédagogiques. Ce cadre conceptuel a pour but d'obvier aux conceptions erronées chez les éducateurs en raison d'un manque de communication, et d'apporter des solutions plus adéquates aux problèmes pédagogiques, dont ceux qui concernent plus particulièrement l'enseignement de la langue de la minorité (Baecher, 1973).

Les sciences pédagogiques reposent essentiellement sur les postulats suivants:

1. L'éducation est un processus de recherche de sens (ou de signification).
2. La pensée est distincte du langage.
3. L'homme est un être social ayant la capacité unique de dégager une signification de son milieu et de ses expériences personnelles par la création et l'usage de symboles.
4. Ne se contentant pas de satisfactions biologiques, l'homme est perpétuellement en quête de signification.

(Hill, 1973)

Ces quatre postulats sont de première importance lorsqu'il s'agit de déterminer la force d'un élève bilingue. Ils complètent la théorie de l'enseignement bilingue dans la mesure où les caractères linguistiques et culturels du sujet sont des facteurs qu'il importe de considérer

dans son développement scolaire. En outre, ils sont essentiels à la compréhension des "styles d'apprentissage".

Les styles d'apprentissage

Le style d'apprentissage du sujet bilingue est la façon dont il tire une signification des structures de connaissances formelles. Pour l'établir, il faut se poser certaines questions fondamentales, dont les suivantes:

1. Comment le sujet prend-il conscience de ce qui l'entoure?
2. Quels symboles choisit-il de préférence pour résoudre des problèmes?
3. Est-il du type auditeur ou lecteur?
4. Comprend-il mieux ou plus rapidement les concepts présentés dans sa langue maternelle?
5. Se fie-t-il à son propre jugement ou a-t-il besoin de l'accord de ses camarades pour prendre une décision?
6. Raisonne-t-il en mathématicien, ou encore en sociologue?

Les réponses à ces questions et à beaucoup d'autres du même type permettent de déterminer la façon dont l'enfant bilingue apprend, i.e. son style d'apprentissage. Les nombreux éléments qui le composent (et dont la combinaison forme des profils particuliers) ont été définis par J.E. Hill (1964), et ont fourni la structure de base des cinq premières sciences pédagogiques. Ce sont: (1) les symboles et leurs significations; (2) les déterminants culturels associés aux significations des symboles; (3) les modes d'inférence; (4) la mémoire cognitive; et (5) le style d'apprentissage. On remarquera que les styles d'apprentissage englobent les quatre autres sciences. La question de la mémoire sera d'autre part exclue de notre propos, vue la place considérable qu'elle offre à la spéculation. Le lecteur pourra consulter à ce sujet l'article de Hill, publié dans The Educational Sciences, 1975.

Les divers éléments constitutifs de style d'apprentissage d'un sujet sont représentés sous forme de "graphe", d'apprentissage, ou portrait des divers profils que les étudiants utilisent pour acquérir des connaissances.

Les graphes d'apprentissage

Les graphes d'apprentissage permettent au maître de découvrir par exemple, quels élèves apprennent plus facilement à l'aide de l'enseignement programmé, de la télévision ou du travail de groupe. En d'autres termes, le graphe d'apprentissage indique les façons propres à chaque sujet d'assimiler une matière donnée le plus aisément possible.

En observant et en interrogeant l'élève, le maître peut se faire une idée de la manière dont il utilise les symboles pour résoudre des problèmes, du rôle qu'ils jouent dans son contexte culturel, ou encore de sa façon de classer, d'opposer ou de mettre en rapport l'information qu'il absorbe.

L'examen du maître, répétons-le, sera fondé sur une observation minutieuse et des questions répétées. La graphe portera sur trois aspects principaux: les symboles et leurs significations, les déterminants culturels et les modes d'inférence.

Le premier domaine d'exploration sera les symboles et leurs significations. Initié aux techniques d'observation et de description du comportement, le maître étudie d'abord l'utilisation que l'élève bilingue fait des symboles. Il peut remarquer, par exemple, que l'enfant comprend mieux à l'audition une matière présentée dans sa langue maternelle, ou que la lecture de l'anglais lui est particulièrement facile; qu'il manie avec beaucoup d'aise les symboles mathématiques ou les relations numériques. Le professeur peut noter comment l'élève se fie à son sens de l'ouïe ou du toucher, comment il entre en rapport avec ses compagnons, quel niveau de connaissance de soi il manifeste en cours d'apprentissage ou avec quelle justesse il s'évalue à diverses tâches éducatives. Tous ces éléments ou symboles dénotent la force du sujet. Ils indiquent comment s'opère la recherche de la signification chez l'individu et la part qu'y jouent ses sentiments, ses valeurs et ses principes. (Pour des explications plus détaillées sur les symboles et leurs significations, le lecteur pourra consulter la bibliographie ainsi que le guide sur les graphes d'apprentissage).

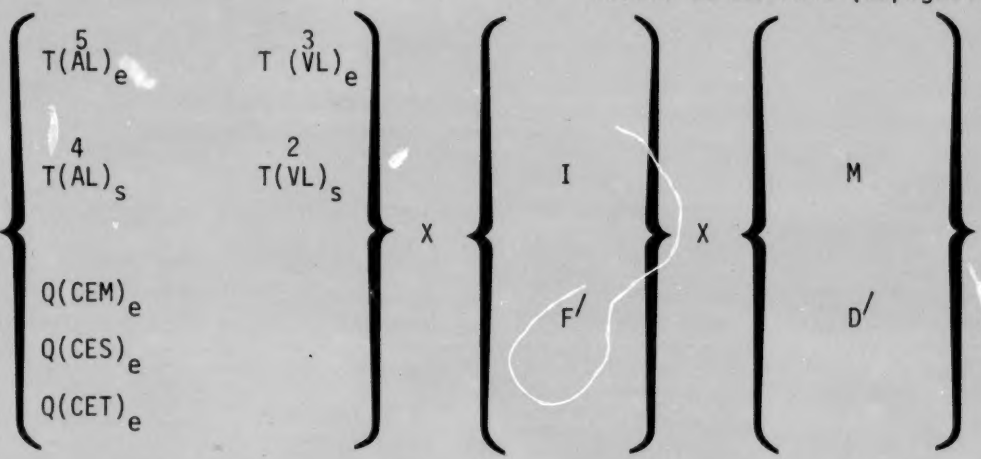
Les déterminants culturels, deuxième aspect de la recherche, permettent au maître de déterminer les facteurs sociaux qui influent sur la façon dont l'enfant bilingue réagit dans des situations concrètes. D'une part, ses compagnons, ou associés, peuvent orienter très nettement sa perception du monde. De sa famille, d'autre part, lui sont venus depuis le très jeune âge des principes et des normes de comportement qui l'accompagneront pendant plusieurs années à l'école. Le maître peut également constater que le tempérament même du sujet influe sur son comportement. En effet, la conscience qu'a l'élève de ce qui le distingue des autres ainsi que la valeur positive ou négative qu'il attribue à ces distinctions déterminent la façon dont il se comporte et partant, la signification qu'il accorde aux symboles. A ce titre, les déterminants culturels offrent aux professeurs des classes bilingues des indications précieuses sur l'"univers humain" de leurs élèves.

Par "modes d'inférence", troisième critère d'examen, on désigne les processus de prise de décisions ou les modes de pensée du sujet. Le maître pourra observer, par exemple, que certains élèves ont un penchant naturel pour la classification, s'appuient sur des règles et des normes de comportement; d'autres raisonnent par des distinctions, ayant tendance à comparer en fonction de critères uniques; d'autres encore, cherchent une multiplicité de rapports entre les diverses choses qu'ils perçoivent. Quelques-uns utilisent tous ces processus. D'autres enfin, plus rares, raisonnent en mathématiciens et suivent la voie de la déduction logique.

On voit que l'établissement des graphes d'apprentissage se fait à partir de données d'observation recueillies en langage courant. Ces données sont alors traduites en sigles qui permettent de simplifier les énoncés.

Prenons en exemple un élève d'une classe de quatrième année bilingue; (Baecher, 1973): ses aptitudes pour la lecture de l'anglais et de l'espagnol sont inférieures à la moyenne. En revanche, sa compréhension auditive de ces deux langues est bonne. Les nombres qui apparaissent au-dessus de chacun des groupes de lettres, T(AL) - T(VL), indiquent le niveau de son développement au moment où son graphe d'apprentissage a été établi.

Élève de quatrième année — 2.7 NIVEAU DE LECTURE (anglais) — 2.7 NIVEAU DE LECTURE (espagnol)



CE GRAPHE SE LIRAIT COMME SUIT:

Absorbe davantage à l'audition qu'à la lecture, tant en anglais qu'en espagnol...

Capable de se mettre à la place d'une autre personne...

Peut apprécier la "beauté" de choses et d'idées...

Fidèle à des règles et à des principes. Travaille consciencieusement...

Individulaliste Forme ses propres jugements...

Accepte les directives d'un supérieur.

Catégorise et classe les événements et les choses...

Compare et oppose des éléments individuellement. Perçoit facilement les différences...

ELEVE BILINGUE NUMERO UN

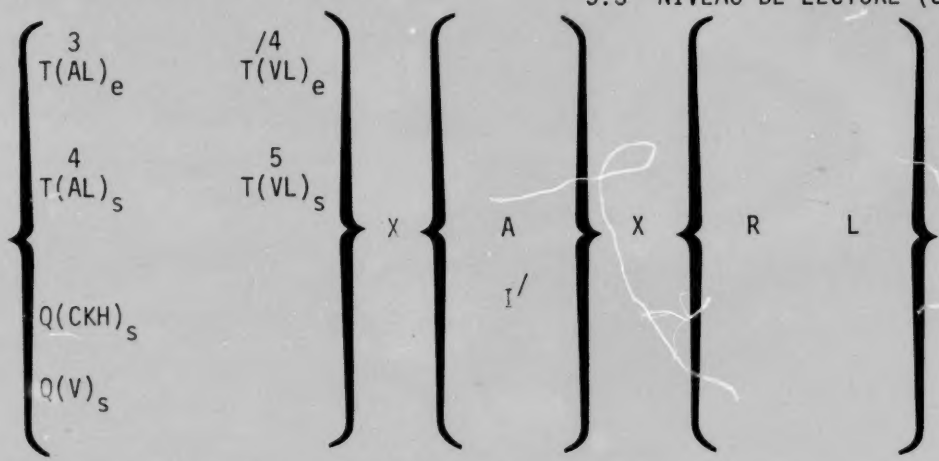
Les indices e et s désignent les types d'épreuves de connaissance de l'anglais et de l'espagnol employées pour déterminer l'orientation symbolique de l'élève bilingue. Dans le cas qui nous occupe, le sujet est sensible aux réactions d'autrui, apprécie la "beauté" de paysages ou de la musique et se conforme à des principes définis. De tempérament individualiste, il forme ses jugements à partir de raisonnements logiques.

Un second élève d'une quatrième année bilingue lit mieux que la moyenne des élèves de sa classe; il est du type lecteur. Influencé par ses compagnons, il apprend par la vue, et perçoit la multiplicité des rapports entre les choses et les événements. Les graphes de ces deux élèves figurent aux pages:

Élève de quatrième année

5.8 NIVEAU DE LECTURE (anglais)

5.3 NIVEAU DE LECTURE (espagnol)



CE GRAPHE SE LIRAIT COMME SUIT:

Comprend mieux à partir de textes écrits, en anglais ou en espagnol que de directives orales...

Comprend par le biais d'indices visuels et d'images...

Particulièrement apte à réaliser des tâches motrices...

Influencé par ses associés ou ses compagnons...

Peut à l'occasion travailler seul...

Perçoit les rapports entre les choses ou les qualités; dans l'apprentissage, préfère l'abondance d'exemples...

Forme ses jugements après avoir examiné attentivement l'information disponible...

ELEVE BILINGUE NUMERO DEUX

On peut constater que le graphe d'apprentissage ne fait pas que mettre en lumière, chez l'élève, les moyens d'apprentissage de prédilection; il lui permet également de se mieux connaître de façon à pouvoir orienter ses études en fonction d'objectifs réalisables. Le style d'apprentissage n'est pas un processus rigide ni immuable, c'est plutôt une recherche dynamique continuellement élargie de la "signification".

Chaque graphe, comme chaque élève, possède ses caractères propres et appelle, par conséquent, un programme d'études personnalisé. Ce type de programme est susceptible d'extension, les éléments faibles pouvant être renforcés chez le sujet par un développement judicieux de ses points forts. Le graphe est un point de départ pour le maître, qui s'en inspire pour établir la "prescription" de l'élève, c'est-à-dire un programme d'études personnalisé en fonction de ses points forts et de ses points faibles.

Prescriptions d'apprentissage

Pour augmenter les chances de succès scolaire du premier élève du type liseur, le maître peut prescrire l'emploi de bandes magnétiques ou de disques en anglais ou en espagnol, lui communiquer ses directives oralement et le faire travailler seul à l'aide de matériel programmé. Il peut diviser son travail en étapes courtes et simples, et, à l'occasion, avoir recours à la musique ou à d'autres éléments de cette nature. Ces prescriptions générales servent en même temps à renforcer la capacité de lecture de l'élève et rien n'empêche le maître de les compléter par tous autres éléments d'apprentissage qu'il juge opportuns (Radike, 1973; Bowman et al., 1974). On pourrait également laisser à l'élève bilingue de choisir ses propres moyens d'apprentissage (des moyens auditifs dans le cas qui nous occupe) ou encore avoir recours à des maîtres spécialisés.

Pour l'élève numéro deux, le maître prescrirait du matériel d'apprentissage visuel et donnerait ses directives par écrit, en anglais ou en espagnol. Comme l'élève travaille facilement au sein d'un groupe, le professeur pourrait imaginer des situations d'apprentissage supervisé par un autre élève. On pourrait associer des activités requérant une certaine habileté motrice au matériel de lecture, confier à l'élève des travaux de classement pour développer chez lui le raisonnement logique, de faire participer à des séances collectives de lecture, le jumeler à un compagnon et lui offrir le choix des moyens d'apprentissage en mettant l'accent sur le matériel visuel.

Ce ne sont là que quelques-unes des multiples prescriptions que les graphes peuvent inspirer au maître. Ce dernier essaiera d'adapter le matériel scolaire disponible aux modes d'apprentissage de l'individu, de

manière à assurer la personnalisation du programme d'études. Les instruments et techniques employés par le maître dans la détermination des modes d'apprentissage de ses élèves permet ainsi de tirer le meilleur parti de leurs points forts.

L'appréciation pédagogique des élèves bilingues

Par "appréciation pédagogique", j'entends le processus systématique par lequel on vise à établir la présence ou l'absence de style d'apprentissage chez l'élève. A ce processus participent les jugements et les décisions que la maître tire de ses observations et autres renseignements obtenus à l'aide d'instruments et de techniques divers. Dans les limites du présent article, je me contenterai de décrire brièvement les résultats de mes propres recherches et les conclusions des spécialistes des sciences pédagogiques (Berry et Sutton, 1973).

A l'égard des symboles et de leurs significations, et plus particulièrement des symboles théoriques, ou ces connaissances acquises au moyen de symboles oraux ou écrits, qui peut avoir recours aux méthodes suivantes:

1. Test de connaissance élémentaire de l'anglais et de l'espagnol.
2. Test de lecture (espagnol et anglais).
3. Tests de mathématiques rédigés en espagnol ou en anglais.
4. Avis de maîtres compétents.

Les symboles non linguistiques ou "qualitatifs", c'est-à-dire des indices visuels et kinésiques, peuvent être étudiés à l'aide d'instruments directs de mesure ou encore d'observations des codes sensoriels, culturels ou programmatiques. (On trouvera une explication plus détaillée à ce sujet dans le guide sur le graphe d'apprentissage).

Pour mesurer la compréhension auditive et les aptitudes pour la lecture en anglais et espagnol - d'étudiants bilingues d'origine Chicano et de Porto Ricaine -, l'auteur s'est lui-même servi de tests normalisés qu'il a adapté à ses fins particulières. Il en a été de même en mathématiques. Pour autant qu'il ait la bonne conception et parle la même langue que l'élève, le maître ne se trouvera pas à court de moyens pour étudier

les éléments du style d'apprentissage.

Au chapitre des déterminants culturels, on étudie les influences sociales sur les significations que les élèves attribuent aux symboles. L'élève parle-t-il souvent de sa famille? Préfère-t-il travailler seul ou au sein d'un groupe? Les réponses à ce type de questions mettent en lumière les influences culturelles dont l'individu est l'objet à travers sa famille, ces compagnons et sa propre personnalité.

Passons enfin aux modes d'inférence et observons si (1) l'élève commence souvent ses phrases par "c'est tout comme si..., c'est la même chose que..., mais que faire si...," (2) s'il ordonne et planifie avec soin son travail ou (3) encore s'il pense à ce qu'il dit.

Ce ne sont pas là les seules manières de tirer le meilleur parti des points forts d'un enfant bilingue: les rapports et les entrevues auto-critiques sont également très utiles. Mais l'essentiel est que les maîtres se sensibilisent enfin aux différents modes d'apprentissage de leurs élèves et adaptent leurs méthodes d'enseignement en conséquence.

Conclusion

Dans un dernier temps, nous résumerons en quelques points importants la contribution que l'analyse des styles d'apprentissage peut faire à l'enseignement de la langue de la minorité. Sans être une panacée, cette technique n'offre pas moins aux enseignants des classes bilingues une perspective nouvelle et positive.

L'enseignement bilingue	Les Sciences pédagogiques
1. Manque très net de perspective d'ensemble et de langage commun entre administrateurs et enseignants au sujet des élèves bilingues.	1. S'inspire d'une conception cohérente et dynamique, tenant compte des orientations symboliques, des influences culturelles, des modes d'inférence et de la mémoire cognitive de l'élève bilingue.
2. Considéré au pire comme une "discipline compensatoire" et au mieux comme un "enrichissement": l'enseignement bilingue ne représente donc qu'une réforme pédagogique partielle.	2. Considère l'élève bilingue continuellement "en voie d'apprentissage" d'où l'établissement d'une théorie des points forts individuels et distinctifs à laquelle les méthodes d'enseignement doivent s'adapter.
3. Révèle, au niveau des programmes d'étude, un intérêt obsessif pour la compétence linguistique et la connaissance des "symboles théoriques" de l'élève bilingue; continue à étiqueter les élèves en fonction de cette unique considération et à leur imposer des programmes d'étude stéréotypés.	3. S'intéresse à l'élève bilingue comme à une "entité", mise sur les points forts de l'individu et élabore des programmes d'étude personnalisés.
4. Manque de méthodes d'appréciation pouvant être adaptées aux besoins particuliers de l'étudiant.	4. Offre aux maîtres une direction; les encourage à inventorier les manières dont l'élève acquiert la connaissance; accorde beaucoup d'importance à la compétence et au jugement du maître.

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LE STYLE D'APPRENTISSAGE AU SERVICE DE LA SELECTION

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LE STYLE D'APPRENTISSAGE AU SERVICE DE LA SELECTION

1.0 LE THEME DE LA JOURNEE PEDAGOGIQUE

2.0 LA SELECTION

- 2.1 Les tests du Ministère de l'Education
- 2.2 La batterie ad hoc

3.0 LE STYLE D'APPRENTISSAGE

- 3.1 Le style d'apprentissage et ses composantes théoriques
- 3.2 Le style d'apprentissage et l'entrevue de sélection
- 3.3 Le style d'apprentissage et le portrait idéal des candidats

4.0 LES SUITES DE LA JOURNEE PEDAGOGIQUE

APPENDICE:

Aptitudes recherchées chez les candidats en techniques de production et d'administration de cuisine.

1.0 LE THEME DE LA JOURNEE PEDAGOGIQUE

À l'Institut de Tourisme et d'Hôtellerie, tous les professeurs participent à la sélection des candidats. Les instruments utilisés jusqu'ici à cette fin comportaient des lacunes, surtout en ce qui concerne les orientations professionnelles. Il s'agit d'ailleurs d'un état de choses général, si l'on s'en rapporte au constat de Monsieur Pierre-Paul Rioux, paru dans le Devoir du jeudi 4 octobre 1973 sous le titre "La 'sélection' dans les cegep de la région de Montréal":

> Le critère des notes, qui est indispensable parce qu'il permet de prédire la réussite de l'élève est cependant insuffisant parce qu'il ne permet pas de prédire le succès dans le métier ou la profession. Un premier de classe, en technique de loisirs, sera peut-être un piètre animateur. Il aura pris la place d'un élève moins brillant qui serait devenu, lui, un animateur plein d'imagination, de dynamisme et de dévouement. Il faudrait donc pondérer les résultats scolaires par des données psychologiques sur les goûts et les aptitudes de l'élève. Malheureusement, les données que l'on peut recueillir sur ces aspects de la personnalité sont très peu sûres et doivent être interprétées avec la plus grande prudence.

Conscients des difficultés inhérentes à la sélection et désireux de raffiner leurs instruments, les professeurs avaient souhaité que l'on s'attaque à cette question dans le cadre des journées pédagogiques.

C'est par ce biais qu'ils se sont initiés à la théorie des sciences pédagogiques du Dr. Joseph E. Hill, et plus précisément à celle du style d'apprentissage, avec la colaboration de Monsieur Claude Lamontagne,

responsable du Service de psychologie et d'orientation du Collège André-Laurendeau. La théorie dy style d'apprentissage ne sert pas qu'à déterminer le cheminement propre à un étudiant une fois entré dans le système. Elle permet aussi de fixer les configurations typiques d'habilités en fonction des diverses orientations professionnelles qui s'offrent à lui à l'entrée du système. C'est ainsi que la configuration convenant à un chef de cuisine comprendrait, par exemple, des symboles gustatif et olfactif hautement développés, i.e. ayant une cote majeure.

La journée pédagogique que les professeurs de l'Institut de Tourisme et d'Hôtellerie du Québec ont consacrée au tandem sélection - style d'apprentissage comportait une partie théorique, consistant pour l'essentiel en une initiation à la théorie des sciences pédagogiques, puis une partie pratique: démonstration du mode de fonctionnement d'une entrevue de sélection selon les catégories du style d'apprentissage et production en ateliers d'un certain matériel selon ces mêmes catégories.

2.0 LA SELECTION

2.1 Les tests du Ministère de l'Éducation

Dans la première communication de la journée, Monsieur Antoine Samuelli, Ph. D., registraire de l'Institut de Tourisme et d'Hôtellerie du Québec, a parlé de l'importance de la sélection, de ses critères ainsi que des outils actuellement utilisés par le Service de mesure et d'évaluation du Ministère de l'Education.

Les renseignements portaient notamment sur les tests administrés à la fin des études secondaires touchant la langue maternelle et les aptitudes aux études postsecondaires. Il ressort que ces instruments doivent être complétés par des instruments plus spécifiques correspondant aux divers secteurs professionnels.

2.2 La batterie ad hoc

Aux tests de fin de secondaire, d'expliquer Monsieur Lamontagne, doivent s'ajouter l'entrevue de sélection et les tests de comportement, par exemple l'épreuve du goût et de l'odorat. Bien que pareils tests n'aient pas figuré directement au programme, on a assisté à une démonstration avec un matériel en provenance du Collège communautaire d'Oakland. Un élève s'est essayé à reconstituer le bloc à ondulations, bloc découpé en neuf tranches ondulées verticalement et horizontalement. Une telle épreuve fournit des renseignements sur des orientations symboliques d'ordre qualitatif: QV, QT, QP, Q(CKH), et même que sur les modes d'inférence M, D, R, L.

3.0 LE STYLE D'APPRENTISSAGE

3.1 Le style d'apprentissage et ses composants théoriques

S'initier à la théorie du style d'apprentissage en une heure et demie environ n'est pas chose aisée, surtout si l'on veut se faire une idée précise de chaque élément des trois premiers ensembles: orientations symboliques, déterminants culturels et modes d'inférence. L'abondance des illustrations concrètes et l'utilisation d'un matériel de tests ont toutefois favorisé l'assimilation.

Un tel matériel fournit des modèles de questions à poser dans une entrevue de sélection. En voici quelques exemples:

Ex. nº 1

Je "parle avec mes mains" pour communiquer.

A. habituellement B. quelquefois C. rarement
D. jamais

Cet énoncé se rapporte à Q(CK).

Ex. n^{o} 2

Comment procéderiez-vous pour obtenir un emploi au sortir de l'école secondaire?

1. Aller au Centre de la main-d'oeuvre et demander une entrevue avec le conseiller en main-d'oeuvre.

A. premier choix B. deuxième choix
C. troisième choix D. quatrième choix

2. Vérifier les différences de salaire, d'avantages sociaux et de tâches pour la même sorte de travail à différents endroits.

A. premier choix B. deuxième choix
C. troisième choix D. quatrième choix

On décrit ainsi quatre comportements correspondant aux quatre modes d'inférence inductive. Les deux cas cités correspondent à L et à D respectivement.

3.2 Le style d'apprentissage et l'entrevue de sélection

La partie pratique de la journée pédagogique a comporté en premier lieu une démonstration d'entrevue de sélection menée d'après les catégories du style d'apprentissage. Un élève de troisième année des techniques de production et d'administration de cuisine a bien voulu se laisser mobiliser à cet effet. Monsieur Lamontagne et le responsable

des journées pédagogiques, Sr Jeannine Cornellier, ont conduit la majeure partie de l'entrevue, après quoi l'ensemble des professeurs ont été invités à poser des questions au "candidat". Ce dernier s'est bien défendu, ce qu'on pouvait attendre d'un finissant.

L'expérience précitée a fait l'objet d'une analyse assez longue portant et sur la technique de l'entrevue de sélection en général et sur les données relatives au cas étudié, c'est-à-dire sur la correspondance entre le style d'apprentissage de notre sujet et son option. Évidemment, nous ne disposions pas du portrait idéal, préalablement traduit dans le langage des "sciences pédagogiques", d'un sujet se destinant aux techniques de production et d'administration de cuisine.

3.3 Le style d'apprentissage et le portrait idéal des candidats

A l'étape suivante, les professeurs se sont répartis en cinq ateliers, un pour chacune des orientations professionnelles offertes à l'Institut de Tourisme et d'Hôtellerie du Québec: techniques hôtelières, techniques de production et d'administration de cuisine, cuisine professionnelle, pâtisserie et boulangerie, service de table.

Le programe prévoyait pour cette partie:

a) la confection du portrait idéal de chaque type de candidat soit au moyen de traits empruntés au modèle théorique proposé, soit selon un vocabulaire ordinaire;

b) la rédaction par chaque participant d'une question permettant d'évaluer un élément du portrait idéal lors d'un test papier-crayon et lors de l'entrevue;

c) la mise au point en groupe de quelques questions à rapporter en plénière.

On conçoit que ces tâches n'aient été que partiellement exécutées faute de temps.

Toutes les équipes ont effectivement dressé un certain inventaire des habilités souhaitables chez leurs candidats. Quelques-unes ont parcouru les trois étapes: formulation des qualités en langage ordinaire, traduction dans le langage du style d'apprentissage, confection de questions ou d'énoncés équivalents dont voici quelques spécimens.

Exemple n^{o} 1

Je me plais à collectionner de belles photographies de revues au sujet de la pâtisserie. Q(CES)

Exemple n^{o} 2

Je discute de décoration culinaire avec des amis. Q(CES)

Exemple n^{o} 3

Comment réagis-tu dans une situation provoquant les rires ou les moqueries de ceux qui t'entourent? Q(CT)

Exemple n^{o} 4

Que préfères-tu?

a) la finale de ton sport favori à la télévision? I

b) une soirée familiale? F

c) le bal annuel de l'école? A

En plénière, on a dû se borner à la critique de quelques questions, dont la construction se révèle un art difficile. Mais combien plus difficile encore celui d'enchaîner les questions selon l'évolution de l'entrevue. A ce propos, notre personne-ressource a proposé l'image du chasseur qui guette une perdrix. La tâche des comités de sélection serait facilitée, si conformément à une suggestion faite ce jour-là, on soumettait les candidats à une épreuve écrite, relative à leur style d'apprentissage dont les résultats seraient connus avant l'entrevue.

4.0 LES SUITES DE LA JOURNEE PEDAGOGIQUE

Les ateliers se sont réunis à nouveau en dehors du cadre dont il vient d'être question afin de reformuler, si besoin était, les objectifs des programmes de cours, puis déterminer les qualités qu'ils supposent. Dans le spécimen donné ci-après, nous attirons l'attention sur le bloc des habilités professionnelles qui se prêtent aisément à une transposition dans le langage du style d'apprentissage. La mise au point d'un questionnaire d'entrevue de sélection et d'autes instruments apparentés en fonction de ce cadre conceptuel sera confiée à des spécialistes.

Les professeurs, maintenant initiés, pourront continuer à s'occuper de la sélection de leurs élèves en utilisant un langage commun et suffisamment raffiné, semble-t-il, pour avoir prise sur les problèmes inhérents à cette opération.

A P P E N D I C E

APTITUDES RECHERCHES CHEZ LES CANDIDATS EN TECHNIQUES DE PRODUCTION ET D'ADMINISTRATION DE CUISINE

A) OBJECTIFS DU PROGRAMME

a) Former des candidats aptes à occuper un poste de responsable de la production alimentaire dans des établissements commerciaux, industriels et institutionnels.

b) Former des étudiants aptes à exécuter des tâches administratives dont le champ d'application est la production alimentaire.

B) QUALITES REQUISES

a) Qualités humaines:

- souplesse d'esprit, capacité de s'adapter à des changements continuels, même conflictuels;
- honnêteté;
- intégrité;
- sobriété;
- sociabilité;
- sens de la hiérarchie;
- mobilité;
- sens des responsabilités: ponctualité, fiabilité, respect de la parole donnée;
- aptitudes aux études collégiales;
- esprit méthodique qui peut suivre un plan et travailler avec ordre.

b) Qualités physiques:

- apparence soignée;
- excellente santé lui permettant de supporter de longues heures de travail, souvent sous tension;
- dextérité des facultés psycho-motrices: coordination;
- sens normalement développés: goût du bon et du beau.

c) Qualités professionnelles:

- habilité à détecter les qualités organo-letpiques des aliments: odeur, contenu, texture, saveur, forme, température, présentation des nuances;
- habilité à mouvoir la main et le pied selon des stimuli visuels;
- exécuter rapidement et exactement des opérations mathématiques;
- avoir le potentiel des relations d'affaires: sollicitation, entrevues, supervision d'employés, de réunions, de rendez-vous, d'administration;
- posséder un potentiel de leadership;
- habilité à percevoir ou reconnaître les similarités et les différences dans les couleurs; percevoir les nuances, reconnaître les combinaisons harmonieuses ou contrastantes.

CAREER MOBILITY THROUGH PERSONALIZED OCCUPATIONAL EDUCATION

At Oakland Community College, each student learns according to his cognitive style. Diagnostic tests guide his career decisions and mode of instruction; extraordinary resources and small curriculum units assure success.

Joseph E. Hill, President
Derek N. Nunney, Vice President
Oakland Community College,
Bloomfield Hills, Michigan.

The authors wish to credit the Applied Sciences and Developmental team for its assistance in the preparation of this article: Lynn Bartlett, director, Instructional Resources; James Dotseth, director, Applied Sciences and Arts Personnel; Billy Rose, director, Human Resources Division, Apprentice and Technical; Betty Setz, director, Community Relations and Research Administration; and Virginia Svagr, director, Learning Systems and Diagnostic Centre.

[1] Reprinted with permission from the American Vocational Journal, October, 1971.

Career Mobility Through Personalized Occupational Education.

A complex, technological society is characterized by pervasive change, quick obsolescence of skills, and outdating of factual knowledge. Most people today can expect to pursue at least three different careers during their lifetimes. A person whose career preparation has been limited to acquisition of skills narrowed by over-specialization may see the job he is capable of performing eliminated by technological advancement.

Selection of appropriate careers requires two types of knowledge: self-knowledge—proper assessment of one's skills, aptitudes, and learning capabilities; and job knowledge—a combination of skills required for successful performance, shifts in employment opportunities, and projection for new careers.

To facilitate vertical and lateral job mobility, Oakland Community College (OCC) has developed a core-cluster approach to vocational education and a personalized education program that provides a diversity of approaches for the accomplishment of educational objectives.

To avoid the waste inherent in disjunctive education, OCC personnel confer on a regular basis with representatives of local high schools and four-year institutions. Students who have completed specific skill training in high school can enter with credit after examination.

Articulation with four-year institutions and industrial employers is an ongoing activity to assure a proper base upon which to build opportunities for higher education relevant to the world of work.

Core-Cluster Concept

To achieve greater articulation between the various vocational programs, during the last two years OCC restructured its courses in the field of Applied Sciences and Arts into seven broad occupational clusters. Course work is divided into core classes

common to all occupations within each cluster, related training, and areas of specialization.

OCC had found that many students' career selections were based on a fuzzy knowledge of job expectations and almost no knowledge of alternatives. Little thought had been given to personal strengths and weaknesses relative to successful performance.

Under the new approach, introductory seminars are offered for each cluster. They are designed to familiarize students with the variety of job opportunities in a selected cluster and to permit them to make an intelligent selection of a specific occupational field of study. For example, the introductory seminar for Allied Health introduces the student to employment opportunities in such occupations as dental assistant, medical office assistant, medical lab technician, and nursing.

Course Work

Concurrently with the work in this introductory seminar, the student might take courses in General Orientation, Foundations of Natural and Life Sciences, and possibly Foundations of Communication or Freshman English, Anatomy and Physiology.

His placement in the various courses is determined by the results obtained from an analysis of his performance on diagnostic tests together with an analysis of his high school or past work experience. During the seminar each student prepares a personalized plan of study to develop the necessary skills and capabilities for his chosen career.

This new structure permits students to solidify their interests and test their abilities before they make their final career selections.

During the first stages of the educational program, the student learns introductory skills common to the occupations in his chosen cluster and takes core and related courses. The introductory course work is designed to apply to all occupational skills in the cluster, thus ensuring maximum articulation and minimum loss of time and credit should the student change direction within the cluster.

The establishment of the core-cluster approach to vocational education required an identification of the commonality of skills and knowledge and the delineation of appropriate related courses and areas of specialization for each occupational area.

In seeking the common denominator skills, OCC made some surprising discoveries. For example, analysis of skills and background required for commercial art aligned the commercial art program with the business job cluster rather than with the industrial sciences.

Personalized Programs

In addition to articulation for lateral and vertical mobility, a third form of articulation is necessary to maximize the student's chances for successful achievement of his educational and occupational goals. There must be articulation between the diagnostic and counselling functions and between these and the design of teaching methods and media.

Although educators are aware that individuals learn not only at different rates but in different ways, little has been done in traditional programs to adapt teaching methods and media to individual differences.

OCC has found that mastery of essential skills and attitudes can be facilitated by the development of personalized educational sequences employing a variety of teaching media, instructional techniques, and flexible time sequences to accommodate each student's identified learning strengths and abilities. The keystone of this approach is a diagnostic testing program that measures students' abilities to acquire meaning through qualitative strengths as well as the more traditional theoretical methods.

Students entering OCC spend three hours taking a battery of tests. Some tests measure subtle abstractions, some measure visual and manual coordination, some index response of senses, and some indicate personal characteristics. The scores achieved on these tests and on demonstrable performances, along with supportive data from personal interviews, are translated into elements of the student's

Figure 1: OAKLAND COMMUNITY COLLEGE ARTICULATION DESIGN

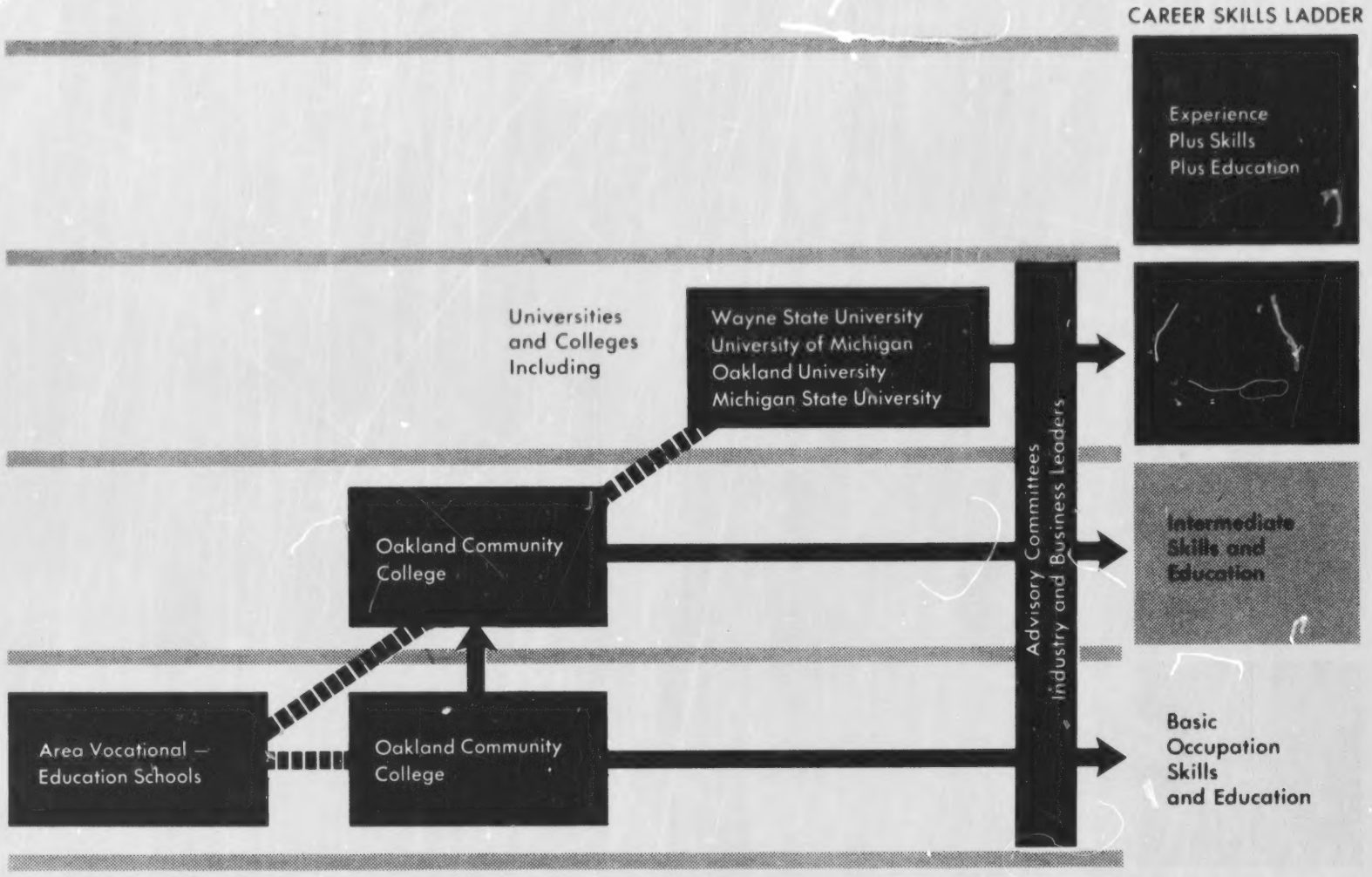
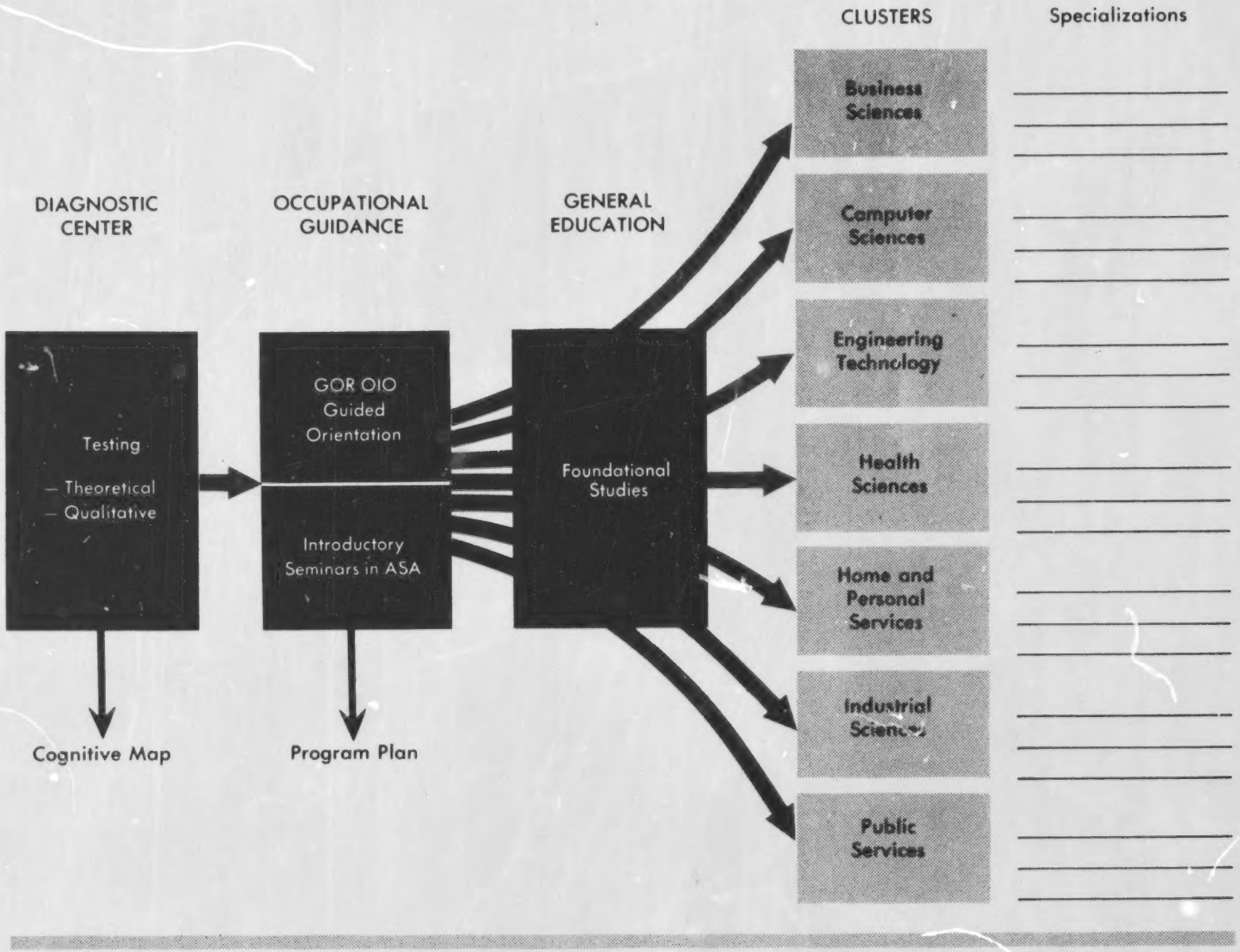


Figure 2: OAKLAND COMMUNITY COLLEGE OCCUPATIONAL GUIDANCE SYSTEM



cognitive map — a picture of the ways he derives meaning from his environment and experiences.

Cognitive Style Mapping

A student's cognitive style is determined by the way he takes note of his total surroundings — how he seeks meaning, how he becomes informed. Is he a listener or a reader? Is he concerned only with his own viewpoint or is he influenced in decision making by his family or associates? Does he reason in categories as a mathematician does or in relationships as social scientists do?

These are a few examples of the facets of human makeup that are included in a student's cognitive style. Family background, talent, life experiences, and personal goals make each of us unique. Each map, like each student, is different.

A cognitive style map, in addition to identifying the ways in which a student can master an educational task most readily, gives him the self-knowledge essential to direct him to realistic career goals. Cognitive style is not immutable. It can be augmented. Missing strengths required for a specific occupation can be built on a student's existing strengths.

Using the student's cognitive style map and subjective information gathered in private conversation, a team of teachers and the student develop a personalized education program geared to the student's strengths and weaknesses — a program which is his personal educational prescription and which promotes his success. A computer is used to expedite the process.

"Burst"

Instruction may call for a very different kind of exposure for one student than for another. The formal classroom and lecture hall are just two among many methods. At OCC, students have a choice. A student who needs structured, step-by-step development may work under professional guidance with programed materials, moving at his own speed.

The student who comes alive in the dynamics of group interaction may participate in free and easy rap sessions with teachers and other students.

The student who relates to teachers more easily on a one-to-one basis may work through conferences with his instructor.

Students who work well with the help of more advanced students may be assigned to tutors.

Each student remains responsible for the content of his courses but he may "burst" into any of several instructional modes appropriate to his needs, ability, and cognitive style.

Scheduled classes remain an essential part of the instructional approach and teachers remain the students' principal point of reference. This flexible programing, which makes success attainable for students, involves careful balancing of professional skills, scientific methods, and equipment.

The environments for the "burst" activities are the carrel arcades, the learning resources center, and the individualized programed learning laboratory.

Programed Learning

The individualized programed learning laboratory is designed for students who like to work alone rather than in groups. Here students use programed texts and other highly organized materials under the supervision of faculty members especially trained in individualized instruction techniques. Students receive expert guidance to solve specific problems.

Each student is given diagnostic tests when he first enters the laboratory and these are used in choosing the programs he will work.

A student working a program progresses through course material in structured steps of increasing complexity. He is quizzed by the programed text at each step and checks his own answers against the correct answers before going on to the next step.

If the answers don't match, the program leads the student back through the material in new directions until he has mastered it—or, if necessary, a faculty member will help him. Some programs utilize tape recordings, audio notebooks and other laboratory equipment.

Students with perceptual problems may be directed to use programed reading machines, portable tachistoscopes, language masters, and other specialized devices. All students may view filmstrips independently and study and manipulate three-dimensional models to make abstract concepts clear.

Relaxed Study

Carrel arcades are large areas for relaxed independent study, small group discussions, and tutorial sessions. The activities are designed by regular faculty members. A separate staff, primarily composed of paraprofessionals working in a supportive role, helps students as they work in their own way and at their own speed.

The carrel arcades contain a variety of audiovisual resources. Students may review videotaped lectures, listen to audiotapes, view films, or study course materials on other audiovisual equipment.

Small groups meet for informal talk sessions with teachers and resource people. Several different prescription centers can operate in the same area with the use of wireless headsets.

Students who work well in groups find the carrel arcades a congenial learning environment. Seminars are conducted for students who feel more comfortable and confident with a faculty member who presents a somewhat fatherly image, and instructors are available for private conferences.

Student Tutors

The carrel arcades are also the setting for the youth-tutor-youth program which makes student help available to other students on a regular basis. Students who have already mastered course materials are

trained by the professional staff to tutor others. For students intimidated by formal situations, youth-to-youth tutoring provides informal guidance in a less threatening atmosphere.

Because the youth tutors themselves may have experienced problems with the course material, they can often spot trouble and suggest solutions that might escape an experienced faculty member.

The student tutors are paid by the college. Each student's progress is reported to the professional staff for feedback into his personalized program of instruction.

Independent Study

Another important setting for the personalized education programs is the learning resources center—a place for the independent student to read and search. The center includes the college library, but offers more than traditional library services. It is a clearinghouse for a large variety of instructional packages and includes microfilms, special displays and research materials in many forms.

The staff members are more than librarians. They assist students on a practical level with course content problems, feeding back, as do other personalized education areas, into each student's continually updated instructional prescription. Essentially, however, the learning resources center is a place where the student who can work independently finds his personal niche.

Mini-Courses

Courses in the personalized education curriculum are broken down into units of a few weeks. These units are actually mini-courses—each having well-defined goals. Students take tests to move from one unit to the next. Successful completion of each unit reinforces a student's positive view of himself.

Constant interaction with faculty, paraprofessionals, and tutors is designed to guarantee successful performance by the student. By analyzing his performance and modifying his prescription, the program humanizes and personalizes the educational experience of each student.

The common negative experience of receiving low grades after long periods of study is replaced by a succession of small victories, leading to total success in the course. The small victories, and therefore the ultimate success, depend on the extraordinary resources which are integral to the personalized program at OCC.

Closed-Loop Feedback

Systems analysis is used to evaluate the results of the program and achieve articulation with the total college program. In this process, a systems analyst measures the degree of accomplishment of mission statements, design criteria, and performance goals. Periodic feedback permits necessary adjustments in the ongoing program and integrates program planning within the college.

Project ARISTOTLE

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INTRODUCTION

Project ARISTOTLE (Automated Retrieval Information System to Track and Optimize the Training and Learning Environment) is a systematic approach to analyse and synthesize the training and learning environment in order to optimize the operation's effectiveness through a computerized network of data bases.

The training and learning environment is defined as a system to fill the skill and knowledge gap between job market requirements and work force capability.

By examining the present situation with respect to job-field requirements, testing of referrals and management of people, and processes to provide particular skills; then designing information systems to optimize these functions, a model for an effective training centre can be generated.

By integrating this synthesized model with existing training centre operations, a new implementation and operational model will be generated. This new model is the primary product of the project.

Two activities operate simultaneously during the project. The total training system is analysed and a proposed set of functions for optimal operation are synthesized. At the same time parts of that system which can be computerized (including those subsystems which are already in existence and employ Electronic Data Processing (EDP) will be identified and integrated into a computer network.

Field testing will be carried out with respect to the following functions: student tracking and record-keeping, diagnosis and prescription, curriculum and instructional resource banking and evaluation of the whole system.

The general model produced will be capable of dissemination and the total system left open to additions and modifications

The groundwork for this project was laid over the last five years through the combined effort of several Senior Adult Training and Educational Development Officers from the Colleges of Applied Arts and

Technology. Active support was provided by Program Coordinators from the Manpower Training Branch of the Ontario Ministry of Colleges and Universities.

Planning began in January, 1975, and final approval was given April 1975. Funding was provided by the Department of Manpower and Immigration through the Training Improvement Projects (TIP). TIP provides financial resources for provinces to undertake activities to improve the efficiency of the Canada Manpower Training Program.

The site of the project is Humber College, Lakeshore Campus, Toronto.[1]

PLANNING MODEL

To carry out its complicated task, the project team is utilizing what is known to educational planners and researchers as the "systems approach."

One specific technique that has found wide acceptance among this systems group is what Silvern describes as LOGOS (Language for Optimizing Geographically Ordered Systems).[2]

This technique allows the project team to carry out complex activities in an orderly manner: i.e., an analysis is made of the elements of a system with its interrelationships; these elements are synthesized into a new whole; a model that can predict the system's effectiveness is designed (on paper); simulation is performed to reveal alternative solutions to problems that may be encountered when the model is used in real-life situations.

In summary form, Figure 1 describes the four stages that the project proposes to carry out (over a period of two and a half years), and the five functions of the Planning Model.

a) Stages

Stage 1: Design of Planning Model
Stage 2: Integration of an "ideal" model with a "real" operating system at Humber Lakeshore

Stage 3: Implementation of Humber Lakeshore Prototype Model
Stage 4: Dissemination of project results.

b) Functions

1.0 Prepare Proposal: Describes project objectives and the steps required for approval by the federal funding and provincial monitoring agencies.

2.0 Develop Project Plan: Describes training-learning environment analysis and synthesis of the elements into a LOGOS model of the "best" training system. Implementation strategies are developed to account for the human elements involved.

3.0 Conduct Project: Describes integration of the "ideal" model elements with the "real" constraints of the Humber Lakeshore system. This dialectical process will result in an "optimal" training model, to be called the Humber Lakeshore Prototype. Implementation will be carried out in two locations, Lakeshore 1 and Keelesdale.

4.0 Evaluate Project: Describes application of the project criteria:
(a) how well the project meets its objectives; and
(b) how much the project improves Canada Manpower Training Program efficiency at Humber Lakeshore.

5.0 Disseminate Project: Describes ways in which the project can share results:
(a) on-going presentations and up-to-date reports can be made available continuously;
(b) a final LOGOS model will be available to all CAATs;
(c) colleges will have access to the Humber Lakeshore system through teleprocessing via telephone and terminals;
(d) colleges having computer systems compatible with the Humber Lakeshore system will be able to obtain application programs developed by the project team.

THE TRAINING-LEARNING ENVIRONMENT

The concept of recurrent training proposed by the Department of Manpower and Immigration,[3] and the recommendations made in the report on Training for Ontario's Future,[4] have triggered an urgent search for a more comprehensive and unified plan to coordinate programs in Ontario. Results from innovations in various colleges have been shared. However, since each activity was conducted in isolation from the other, a global approach has been suggested so that collegial applied research and development can be accomplished more effectively.

(a) Training-Learning Philosophy

The training-learning environment that evolved during the last 15 years assumed that a fixed time (e.g. 40 weeks) could be used to achieve a fixed content (e.g. course objectives for Academic Upgrading). The variable is the individual, who must change his/her behaviour to meet the fixed content and time requirements.

In recent years some attempts have been made to free the time taken by an individual to complete a program, but fixed time still remains the efficiency standard.

There also has been a tremendous effort to organize the curriculum content to enable a student to start at any time. However, the content is primarily the same for everyone. In other words, students were told they can move at their own speed, but everyone had to accomplish the same objectives in practically the same time.

The approach being suggested by Project ARISTOTLE can be represented by the paradigm in Figure 2: **The Learning Dynamic.** By shifting the focus of attention to the person, a comprehensive diagnosis of individual needs, abilities, cognitive styles and career goals can be conducted; a personalized prescription can be generated to enable the person to accomplish his objectives; time and resources can be systematically managed for maximum utilization.

By adopting this approach, a flexible training program can be designed for the individual, as the emphasis is on placing the student at the centre of the training process. The training institution should

attempt to provide the individual with the lacking knowledge, attitudes, and skills that are required for a particular occupational goal. The training program's effectiveness depends primarily on accurate information about the individual, and up-to-date information about the job requirements.

(b) The DACUM Approach

The project is using the DACUM (Designing A Curriculum) Approach[5] as the major innovation in curriculum development bridging the gap between what the individual should learn in the training centre, and what is required in the job. Using the major classification system suggested by the Canadian Classification and Dictionary of Occupations, DACUM Charts for Programs are coded and classified to the level of Terminal Performance Objectives and Intermediate Performance Objectives. These charts are up-dated through DACUM Committees. Test questions, other forms of evaluation, and resources such as books, audiovisual materials and learning experiences that are related to the objectives are also coded.

(c) Cognitive Style Mapping

The project is using cognitive style mapping as the major innovation to interpret the individual's interests and preferred ways of learning.[6] A profile for each occupation is to be developed based on cognitive style elements but also employing some elements from General Aptitude Test Battery results. A map of the occupational field will be generated. By using a matching procedure developed for this purpose, a training profile for each person can be generated based on the percentage of match between the occupational and the personal map. Different learning modes that can be suggested to optimize the individual's learning strengths are added.

Career planning for short, medium and long term, can be based on the individual's achievement and potentials as derived from the cognitive style map.

(d) Optimizing the Training-Learning Environment

The paradigm for The Learning Dynamic features the interaction of person, content, and time.[7] The persons, processes, and properties

(things), and their interconnections should be managed efficiently if the training program is to be effective. By considering the training-learning environment as a system,[8] the components can be managed and the people involved should be able to perform their functions of planning, organizing, controlling, coordinating and leading.[9]

Information must be provided to students, instructors, counsellors, administrators and agencies, if the training system is to run smoothly.

The project is using the latest technique in computer technology to facilitate this information flow. This is called Data Base Management System.[10]

CONCLUSION

ARISTOTLE is more than an acronym. The name was chosen to symbolize the designers' approach of taking the best of the philosophical, humanistic, and systematic elements to build a training system for Ontario. It is also the designers' emphasis that although we deal with computers, the philosopher should be master of the machine.

FIGURE 1 - PLANNING MODEL FOR PROJECT ARISTOTLE

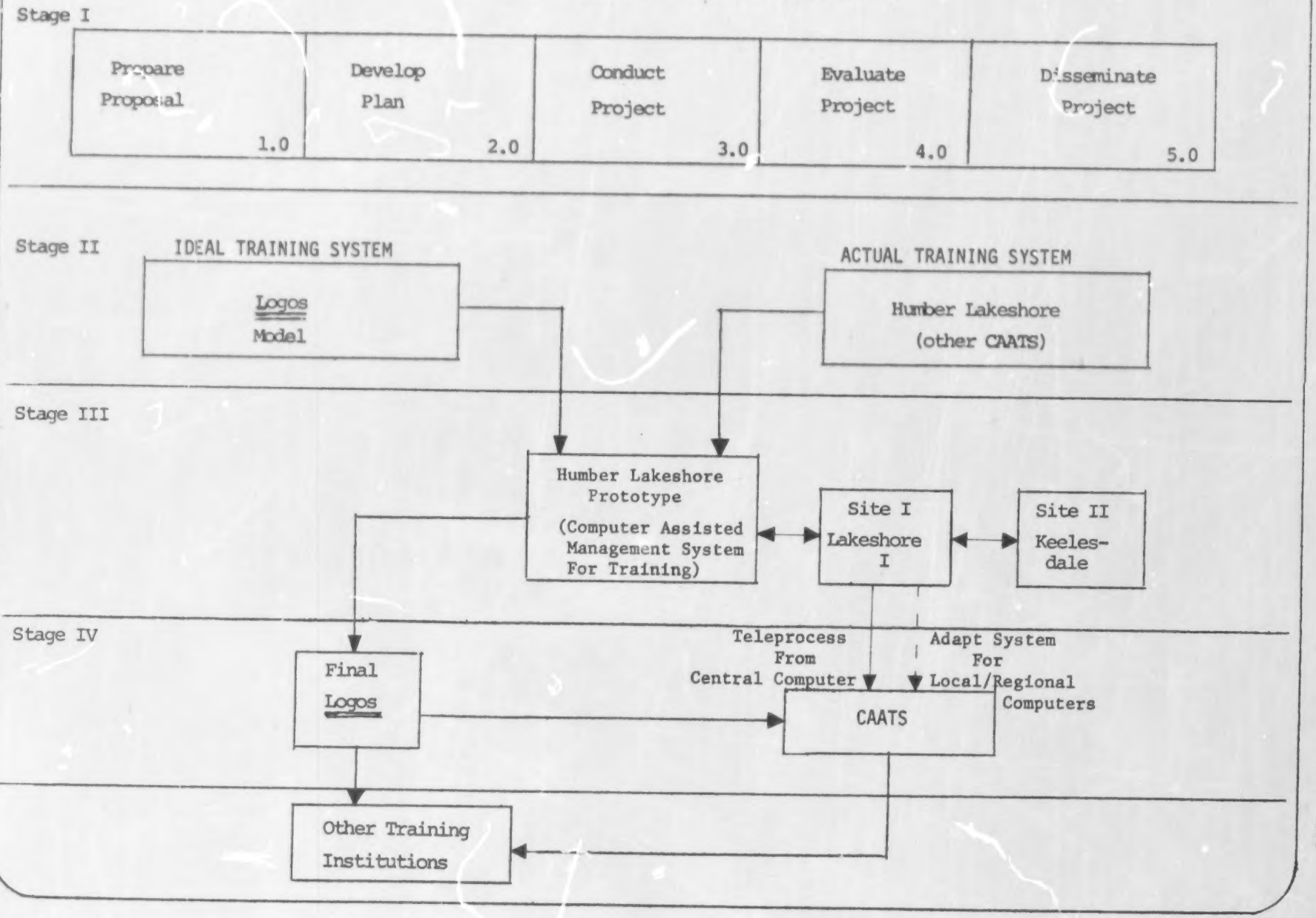
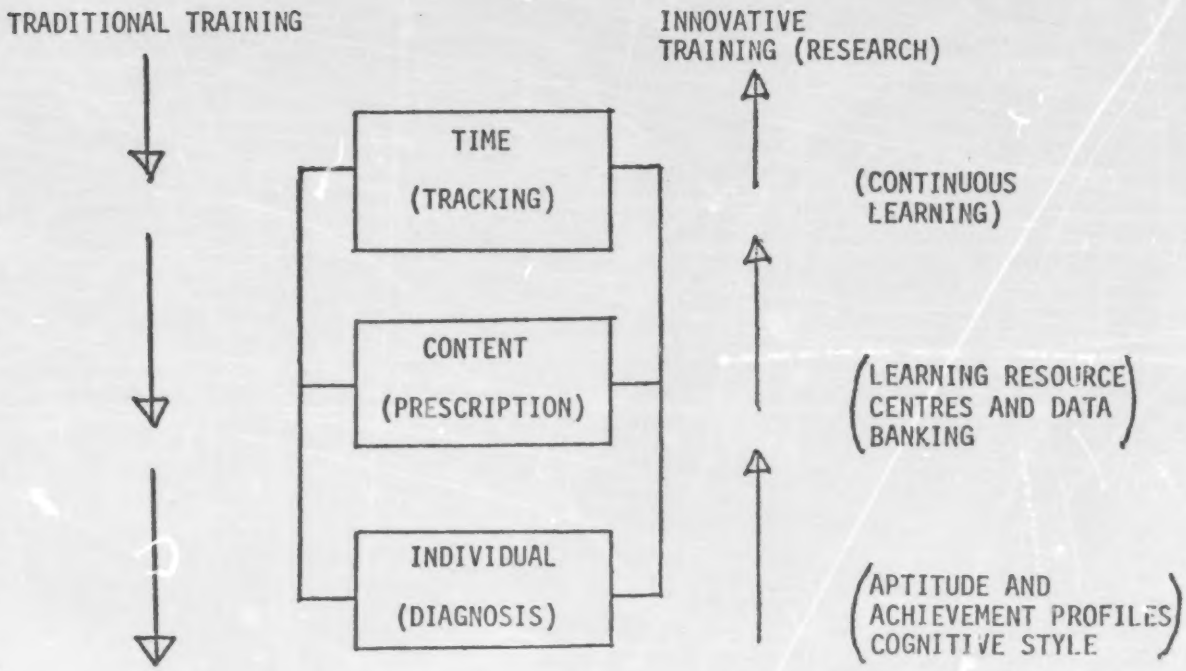


FIGURE 2

THE LEARNING DYNAMIC



( ) BRACKETS INDICATE ELEMENTS OF PROJECT ARISTOTLE

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Projet ARISTOTE

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INTRODUCTION

Le projet ARISTOTE (de l'anglais ARISTOTLE, sigle de (Automated Retrieval Information System to Track and Optimize the Training and Learning Environment) propose la création d'un système d'analyse et de synthèse des données qui permettrait au milieu de formation et d'appprentissage d'atteindre une efficacité maximale, grâce à un réseau informatisé de centrales de données.

Le milieu de formation et d'apprentissage se définit comme un système qui permet de réduire l'écart entre l'offre et la demande sur le marché du travail.

Dans ce projet, il s'agit d'une part de concevoir un modèle de centre de formation efficace, à partir d'un examen des exigences d'emploi, d'une vérification des présentations en emploi, de la gestion du personnel et des méthodes d'acquisition de compétences; et d'autre part d'élaborer des systèmes d'information capables d'optimiser ces fonctions.

L'intégration du modèle synthétisé aux opérations actuelles d'un centre de formation permettra l'implantation d'un nouveau modèle opérationnel qui constituera le principal résultat du projet.

Deux activités seront conduites de pair: d'une part, l'analyse et la synthèse de tout le système de formation en un ensemble de fonctions proposées pour atteindre une efficacité optimale; d'autre part, l'identification et l'intégration en un réseau informatisé des éléments qui peuvent être traités par ordinateur, y compris les sous-systèmes déjà en usage.

On vérifiera sur place les fonctions suivantes: l'enregistrement des étudiants avec mention du diagnostic et du programme prescrit, la conservation en mémoire des cours et des ressources de formation et l'évaluation du système dans son ensemble.

Le modèle général qui en découlera pourra être diffusé et permettra de faire des additions et des modifications à tout le système.

Ce projet est le fruit de cinq années de coopération de plusieurs agents de formation et d'élaboration de cours pour adultes dans les Collèges

d'arts appliqués et de technologie. Leurs efforts ont été secondés par la Direction de la formation de la main-d'oeuvre du Ministère des Collèges et Universités de l'Ontario.

La planification a débuté en janvier 1975 et le projet a reçu l'approbation officielle au mois d'avril suivant. Le Ministère de la Main-d'oeuvre et de l'Immigration a fourni les fonds nécessaires par l'entremise de son Programme d'amélioration de la formation. Ce programme met à la disposition des provinces une assistance financière dans le but d'améliorer l'efficacité du Programme de formation de la Main-d'oeuvre du Canada.

Le Campus Lakeshore du Collège Humber de Toronto a été choisi comme site du projet.

MODELE DE PLANIFICATION

Afin de pouvoir exécuter ses travaux complexes, l'équipe du projet se sert de ce que les chercheurs et les planificateurs en éducation connaissent sous le nom d'"approche des systèmes".

L'une des techniques généralement acceptée de cette approche est celle du langage pour l'optimisation des systèmes d'ordonnancement géographique [2], que Silvern appelle LOGOS, sigle de Language for Optimizing Geographically Ordered Systems.

Cette technique permet à l'équipe d'exécuter des travaux complexes d'une façon ordonnée à savoir: faire l'analyse et la synthèse des éléments d'un système et de leurs corrélations; construire un modèle de prévision pouvant prédire l'efficacité du système et en faire la simulation dans des conditions réelles afin de trouver des solutions alternatives à des problèmes qui pourraient surgir.

Le tableau nº 1 résume les quatre étapes du projet réparties sur une période de deux ans et demi ainsi que les cinq fonctions que prévoit le modèle de planification.

a) Les étapes:

1e étape: Conception du modèle de planification
2e étape: Intégration d'un modèle "idéal" au système "réel" en place au Humber College
3e étape: Mise en application du protype du Collège Humber Lakeshore
4e étape: Diffusion des résultats du projet.

b) Les fonctions:

1.0 L'ébauche du projet: Décrire les objectifs du projet et les étapes à suivre pour obtenir l'approbation officielle du gouvernement fédéral qui fournit les fonds et des organismes de contrôle provinciaux.

2.0 L'élaboration d'un plan: Faire la description analytique du milieu de formation et d'apprentissage et la synthèse des éléments en un modèle LOGOS du système de formation "optimal". Concevoir des stratégies d'implantation tenant compte de l'élément humain.

3.0 La conduite du projet: Décrire l'intégration des éléments du modèle "idéal" aux contraintes "réelles" du système de Humber Lakeshore. Ce procédé dialectique aura pour résultat un modèle pratique "optimal" appelé le prototype de Humber Lakeshore qui sera installé aux Campus Lakeshore et Keelesdale.

4.0 L'évaluation du projet: Décrire l'application des critères du projet.

a) à quel point le projet atteint ses objectifs et
b) dans quelle mesure le projet améliore l'efficacité du Programme de formation de la Main-d'oeuvre du Canada à Humber Lakeshore.

5.0 La diffusion du projet: Décrire les moyens de divulguer les résultats du projet:

a) par des présentations sur place et des rapports réguliers;
b) en mettant le dernier modèle LOGOS à la disposition de tous les Collèges d'arts appliqués et de technologie d'Ontario;
c) en rendant le système de Humber Lakeshore accessible aux collèges grâce à la transmission par téléphone et par terminal;
d) en offrant aux collèges possédant des systèmes informatisés compatibles à celui de Humber Lakeshore la possibilité d'obtenir des programmes de mise en application conçus par l'équipe du projet.

LE MILIEU DE FORMATION ET D'APPRENTISSAGE

Le concept de la formation récurrente mis de l'avant par le Ministère de la Main-d'oeuvre et de l'Immigration[3] et repris dans les recommandations du rapport de la Commission Diamond intitulé "Training for Ontario's Future"[4] ("L'avenir de la formation en Ontario") ont révélé l'urgente nécessité de chercher à coordonner les programmes ontariens selon un plan unifié. Les Collèges partagent les résultats de leurs innovations. Cependant, comme chacun opère isolément, on propose d'adopter une approche globale qui leur permettrait d'accomplir leurs recherches appliquées avec plus d'efficacité.

a) Philosophie de la formation et de l'apprentissage:

Le milieu de la formation et de l'apprentissage a cru, au cours des quinze dernières années, qu'une période de temps déterminée, soit quarante (40) semaines, permettrait à un individu d'absorber un contenu déterminé, comme les objectifs des programmes de recyclage scolaire; la variable demeurait l'individu qui doit s'adapter aux exigences de temps et de contenu.

Plus récemment, on a tenté d'assouplir le temps qu'il faut à un individu pour mener à terme son programme, mais la durée fixe est demeurée la norme d'efficacité.

On a également fait un immense effort d'organisation dans le contenu des programmes afin de permettre à l'étudiant de débuter n'importe quand. Cependant, le contenu demeure fondamentalement le même pour tous. En d'autres termes, on disait aux étudiants qu'ils pouvaient progresser à leur propre rythme mais chacun devait atteindre les mêmes objectifs dans pratiquement le même temps.

On peut représenter la méthode proposée dans le projet Aristote par le schéma du tableau nº 2: la dynamique d'apprentissage. En prenant l'individu comme centre d'attraction, il est possible de diagnostiquer l'ensemble de ses besoins, de ses aptitudes, de ses styles d'apprentissage et de ses objectifs de carrière. En outre, on peut prescrire un programme personnalisé qui permet réellement à l'individu de réaliser son but; enfin, on peut assurer l'utilisation optimale du temps et des ressources en les organisant de façon systématique.

En plaçant l'étudiant au centre même de son processus de formation, on peut lui bâtir par cette approche un programme de formation souple. L'institution d'enseignement doit pouvoir fournir aux individus les connaissances, comportements et aptitudes qui leur manquent et qui sont nécessaires à la poursuite de leur carrière. L'efficacité du programme de formation dépend surtout de l'exactitude des renseignements concernant l'individu et de la mise à jour de l'information quant aux exigences d'emploi.

b) La méthode DACUM:

En utilisant la méthode de conception de programme, dite DACUM (Designing a Curriculum)[5], le projet comble le fossé entre la nature du programme au centre de formation et les exigences de l'emploi. Les graphiques de programmation DACUM sont codifiés et classés, en objectifs finals et en objectifs intermédiaires, suivant la Classification canadienne descriptive des professions. Des comités sont spécifiquement chargés de tenir ces graphiques constamment à jour. On codifie également ce qui se rapporte aux objectifs comme les questions d'examen et autres modes d'évaluation de même que les ressources telles que les publications, le matériel audio-visuel et les expériences d'apprentissage.

c) Les profils d'apprentissage:

Le projet utilise la méthode innovatrice des graphes d'apprentissage afin de découvrir et d'interpréter les intérêts et les modes privilégiés d'apprentissage de l'invidivu. Cette méthode permet de développer un profil pour chaque profession à partir d'éléments tirés d'une part, des styles d'apprentissage et, d'autre part, de la Batterie des tests d'aptitudes générales. On obtient un profil de formation personnalisé en comparant le graphe d'un individu au profil de la profession de son choix. A ce profil de formation peuvent s'ajouter d'autres modes d'apprentissage qui pourraient augmenter sensiblement les capacités d'apprentissage de l'individu.

La planification de carrière à courte, moyenne ou longue échéance peut être conçue à partir des performances de l'individu ainsi que de ses possibilités de rendement telles que révélées par son graphe d'apprentissage.

d) Optimisation du milieu de formation et d'apprentissage:

Le schéma de la "dynamique de l'apprentissage" démontre l'interaction individu/contenu/temps.[7] Les individus, les processus, les choses et leurs corrélations devraient, pour assurer l'efficacité du programme de formation, faire l'objet d'un contrôle adéquat. Il est possible de maîtriser les composantes en considérant le milieu de formation et d'apprentissage comme un système,[8] les personnes engagées dans le programme seraient ainsi en mesure d'effectuer les fonctions de planification, d'organisation, de contrôle, de coordination et de direction.[9]

Toute l'information nécessaire devrait parvenir aux étudiants, professeurs, conseillers, administrateurs et aux services intéressés afin que le système d'apprentissage fonctionne bien.

Le recours aux techniques informatiques les plus récentes facilite la circulation de l'information. Le système employé en est un de gestion des dossiers informatisés.[10]

CONCLUSION

Aristote est plus qu'un sigle. Il veut signifier l'intention des concepteurs de retenir les meilleurs éléments de philosophie, d'humanisme et de technologie afin de bâtir un système de formation pour l'Ontario. Quoiqu'ils travaillent avec des ordinateurs, les concepteurs n'en croient pas moins fermement que l'homme doit demeurer le maître de la machine.

TABLEAU 1 - MODELE DE PLANIFICATION DU PROJET ARISTOTE

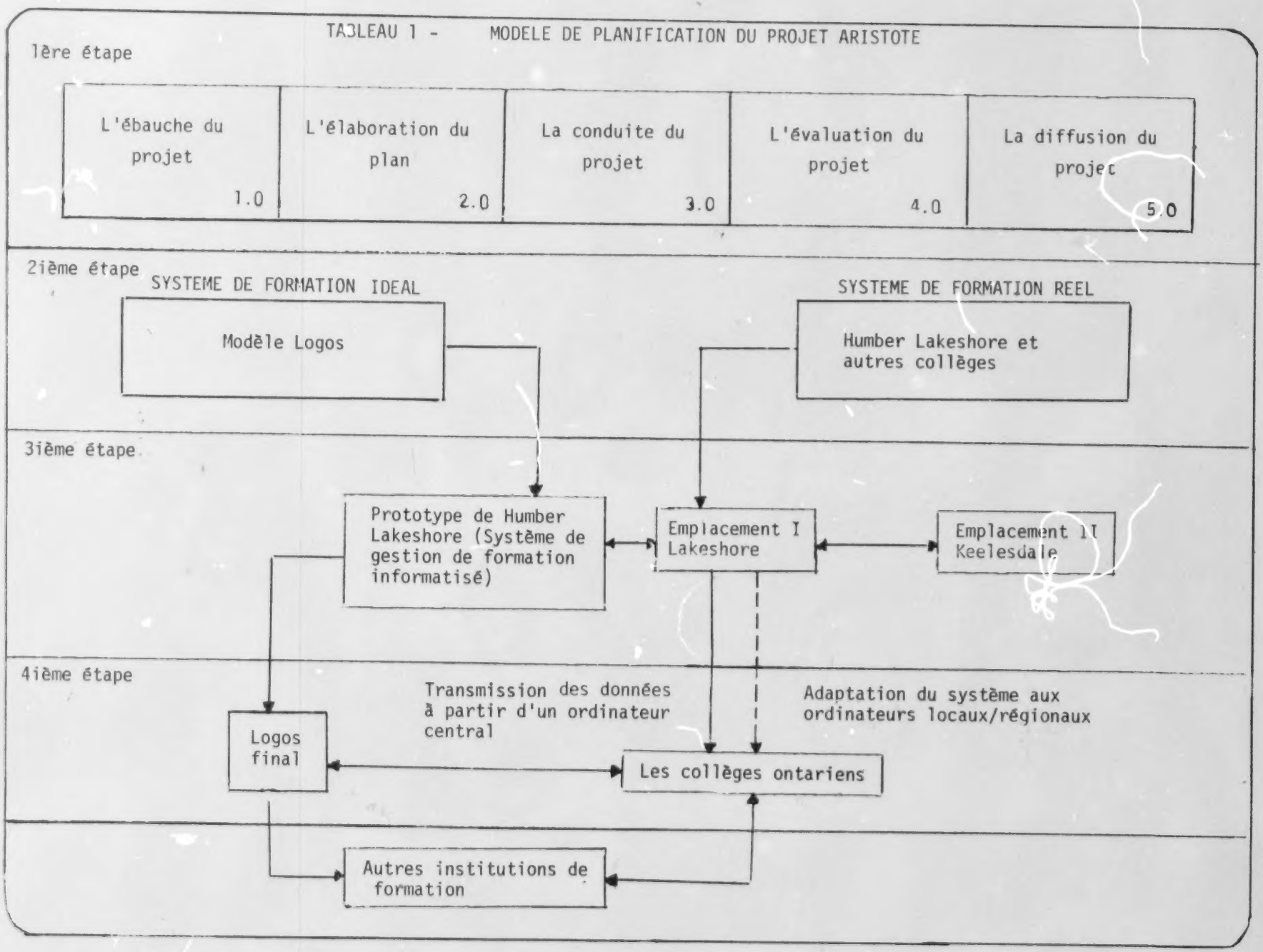
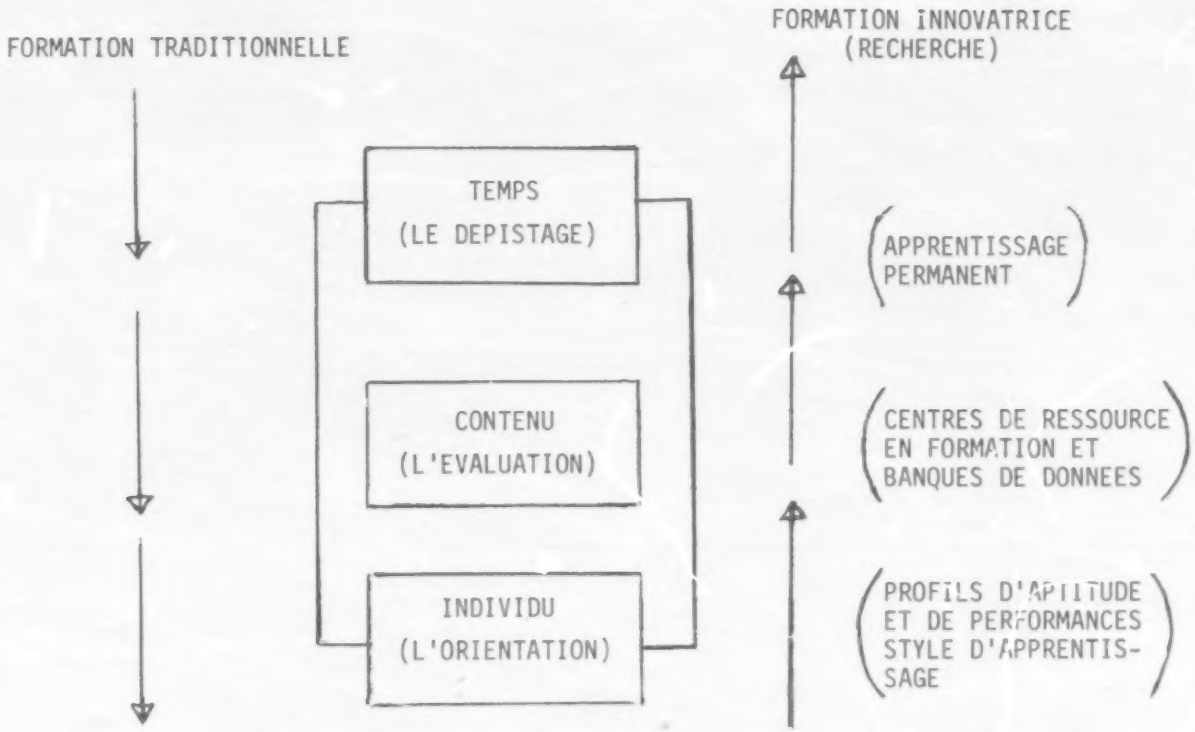

1ère étape
L'ébauche du projet 1.0
L'élaboration du plan 2.0
La conduite du projet 3.0
L'évaluation du projet 4.0
La diffusion du projet 5.0
2ième étape
SYSTEME DE FORMATION IDEAL
Modèle Logos
SYSTEME DE FORMATION REEL
Humber Lakeshore et autres collèges
3ième étape
Prototype de Humber Lakeshore (Système de gestion de formation informatisé)
Emplacement I Lakeshore
Emplacement II Keelesdale
4ième étape
Transmission des données à partir d'un ordinateur central
Adaptation du système aux ordinateurs locaux/régionaux
Logos final
Les collèges ontariens
Autres institutions de formation

TABLEAU NO 2

LA DYNAMIQUE DE L'APPRENTISSAGE



( ) LES PARENTHESES INDIQUENT LES COMPOSANTES DU PROJET ARISTOTE

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HUMANIZING THE FACULTY ADVISORY ROLE THROUGH COGNITIVE STYLE MAPPING

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Systems Approach ! Comprehensive Achievement Monitoring ! Behavioural Objectives ! Criterion-Referred Testing ! Cognitive Style Mapping ! Individualized Instruction ! Inevitably educators who fail to understand the basic concepts will cry out against dehumanization and accuse the institutions who apply the Educational Sciences of forgetting about the dignity and uniqueness of the individual student. Many times I have had to answer the question, "But what about the individual?", or to refute the statement, "It's all so dehumanizing".

I see these questions and claims resulting from the age-old phenomenon: "fear of the unknown." Educators today tend to shy away from the technological jargon that is emerging from the Educational Sciences. Technology itself is often considered dehumanizing and we have a strong tendency to generalize this belief and conclude that the application of technology to education is also dehumanizing. Perhaps if the mystery were removed from the emerging technological jargon, educators could begin to apply the findings of research and technology in a systematic manner without fear.

Many of the innovations in education have, however, emerged as weapons in the battle AGAINST dehumanization. Cognitive style mapping, developed by Joseph Hill et al at Oakland Community College in Bloomfields, Michigan, is about as fine an example of this as I have found. My experiences with "cognitive style mapping" have taught me that education has to approach even the humanization problem in a systematic manner. The image of the "natural born leader" who can spot personal and learning problems, learning strengths and weaknesses, through some miraculous innate gift, is highly romantic and not very practical. However, the idea that well trained educators can recognize these problem areas through interpretation of a cognitive style map is not only practical, but is presently being put into practice.

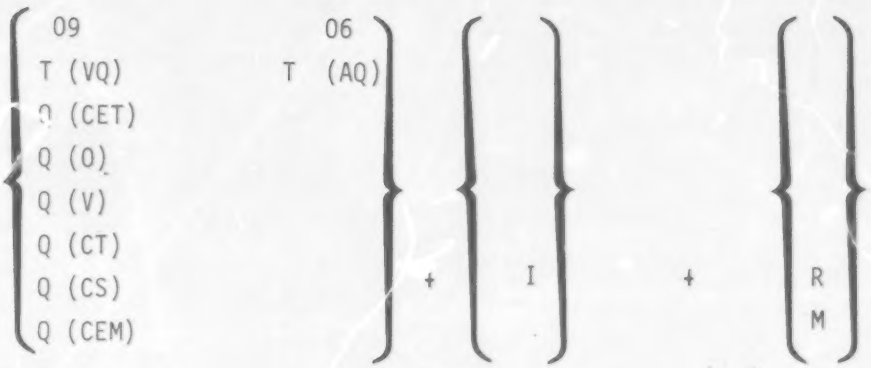
To me, a cognitive style map is simply a quick way of learning specific traits about specific students. Information gleaned from reading a cognitive style map in 15 minutes could be obtained by any perceptive educator through observing a student over a period of

two to three months. However, the type of information given in a cognitive style map is essential in making effective decisions about the instructional conditions which must be created for a given student. In other words, if my role as "teacher" is to create environments which maximize learning, to do that effectively I must have a realistic idea of the strengths and weaknesses of the learner functioning in that environment. Cognitive style mapping quickly provides me with a "map" of the learner's "internal environment".

The faculty advisory role includes not only management of the learning environment, but also responsibilities related to solving specific learning problems of particular students. If a student comes to me complaining that he or she just "can't do science" it is my responsibility to help the student solve that problem, and the first step lies in finding out why the student "can't do science". The underlying assumption in this situation is obvious — the student is actually saying: "Given that I am who I am, I cannot learn science in the specific learning environment to which I am now exposed". The problem is now two-fold. First, I must find out who the student is and then help the science instructor to create a learning environment that matches the student.

The cognitive style map of the student guides me in both areas. At this point, there are many possible situations which may emerge. I will create a hypothetical situation and follow it through to a logical solution.

Suppose that Joe Student's cognitive style map tells me that he is a highly visual person with a grade nine reading level in the quantitature area 09 - T (VQ). He also responds poorly to group situations due to lack of self knowledge Q, (CS) and a low empathy level Q, (CEM). However, he is a very independent person who can be trusted not to cheat I, Q (CET). Finally, I can learn from the map that Joe Student reasons primarily through seeing relationships, but is capable of applying a systematic approach to problem solving, R M. His cognitive style map might look like this:



After analysing the student's cognitive style, my next step is to analyse the learning environment in which Joe has been placed. Through discussion with the science instructor, I may learn that Joe has been placed in a discussion group using films and audio tapes to stimulate discussion. Although this instructional technique is excellent in itself, for Joe, it is a disaster. His ability to understand quantitative concepts through the audio senses is low, consequently he would get little from the tapes and films, and he functions poorly in group situations. No wonder he "can't do science". From this point, the solution becomes obvious. Direct Joe to resource materials which have a high concentration of reading at grade eight or nine level and give him a set of study instructions so he can work on his own. Joe will soon learn that he "can do science".

The process described above takes only a few minutes to enact — provided that both faculty advisor and science instructor are familiar with the concepts of cognitive style mapping and the language used to discuss cognitive styles. It is a humanistic solution to a very common human problem.

Thus far I have discussed cognitive style mapping as it relates to two functions of the faculty advisory role: as decision-maker in the process of designing learning environments, and as a problem-solver for specific learning problems.

Another role which a faculty advisor will inevitably find himself or herself in is that of counsellor. Students often bring

personal problems to their faculty advisor in the hope of obtaining some concrete advice on dealing with these problems. Cognitive style mapping aids the advisor in this situation as well. Primarily, the advisor should examine the student's modality of inference and compare it with his/her own. If the student reasons mathematically and logically and the advisor reasons through perceiving differences and relationships, then the advisor is already attuned to some of the problems which may rise in communication between himself/herself and the student. Cognitive style maps will also provide guidelines for the advisor concerning tendencies of the student. A high Q (CT) will indicate that the student is perfectly capable of influencing others' attitudes; a high Q (CS) will indicate that the student's observations about himself/herself are probably fairly accurate, a high Q (CH) will indicate that the student has a tendency to dramatize real life situations. The clues from cognitive style mapping are many, and if used well can facilitate communication between the student and his advisor.

I feel compelled to insert a word of caution at this point. Although the faculty advisor will have to deal with some of the student's living problems, she should always be on the alert for the need for professional counselling. The line between day-to-day living problems and severe emotional problems is thin, and more often than not, the faculty advisor is not a trained therapist. The faculty advisory role is no place for an armchair psychologist to practise lay therapy.

As a faculty advisor it is my goal to deal with each individual student humanistically and realistically. By providing me with a picture of each student's strengths and weaknesses as well as my own, cognitive style mapping has increased my effectiveness. Even today, when I am working in a situation which does not supply cognitive style maps for each student, I find myself engaged in empirical mapping of the students I meet. By mapping a student's cognitive style, I am not only more equipped to deal with human problems in a humanistic manner, but I am also more prepared to predict probable behaviour of students and, therefore, to take steps to prevent the needless creation of problems.

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